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ROYAL BOTANIC GARDENS, KEW

## LVI.—THE GRASSLAND VEGETATION OF THE CAMEROONS MOUNTAIN.

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### INTRODUCTION.

The following remarks on the grass flora of the Cameroons Mountain have been drawn up from observations by the writer during several botanical trips along its eastern slopes, and from a fairly comprehensive collection of its grasses.

The region is of considerable interest botanically, as many of its species are endemic, and there is still much to be known regarding it.

It is hoped that these notes will add to our knowledge of the area and provide a comparison with the other mountain regions in the African Tropics and with those in other Continents.

The Mountain lies on the edge of the Bay of Biafra in the Gulf of Guinea on the west coast of Africa, between 3°57′–4°27′N. and 8°58′–9°24′E. It is a huge, volcanic mass, its lower peak rising abruptly from the sea to 13,336 ft. (4100 m.) in its main peak, which is about 14 miles away. It is roughly oblong in shape, and extends inland to about 28 miles, forming a land mass of about 600 sq. miles. It is considered to be of the same basaltic origin as Fernando Po, Prince's Is., St. Thomas Is., and Ascension in the Atlantic.

It will be observed from its position that it lies within the tropical rain-belt, and some local records compare with those of Assam, which holds the world's record for rainfall. There are records for Debuncha, a plantation at sea-level, showing as much as 316·64 in. for one year, and for Buea at 3200 ft. (984 m.), the highest station on the Mountain, as much as 121·96 ins.

These excessive precipitations do not hold for the whole mountain area, and, although there are no records for the higher altitudes, the Buea meteorological records would indicate that above the rain-forest belt, mist and drizzle during the rainy period, as opposed to the torrential downpours of the lower levels, are the rule. In addition, the porosity of the great lava folds of the upper regions precludes the accumulation of moisture supplies.

The seasons are very well defined. There is a period of heavy rains, occurring between the months of June and October, with July, August and September the excessively wet months ; and a dry period, extending from November to May, with December, January, and February very hot. The latter season leaves the mountain grass-land dry and parched, and causes many of the forest trees to

cast and renew their leaves. The periodic dessication, the rarified air, and the edaphic conditions in the upper reaches all combine to give rise to a flora with marked xerophytic characters.

## Zonation.

The vegetational zones of the Mountain are also well-defined and can be classified as follows :—

The Mangrove Zone. This is confined to the southern end of the Mountain, and to the estuaries of the Rio del Rey and Mungu rivers. It is a mere fringe, interrupted in parts where the rugged rocks form the fore-shore.

The Rain-Forest Zone. This succeeds the Mangrove zone and covers the slopes up to 6500 ft. (2000 m.). It contains a sub-zone with its higher limit at 3200 ft. (984 m.), where the coastal components of the rain-forest cease.

The Mountain Forest Zone. This immediately follows the Rain-Forest zone, and is characterized by a formation consisting of *Hypericum lanceolatum* Lam., *Lasiosiphon glaucus* Fres., *Rapanea neurophylla* Mez, *Lachnopylis Mannii* Hutch. et M. B. Moss, *Schefflera Hookeriana* Harms, *Myrica arborea* Hutch., *Pittosporum Mannii* Hook. f., etc., with its higher limit at 8500 ft. (2616 m.).

The Mountain Grass-Land Zone, with its higher limit at 11,000 ft. (3384 m.).

The Alpine Desert Zone. This succeeds the grassland at 11,000 ft. (3384 m.) and continues to the summit.

Apart from the extensive community described as a sub-zone within the rain-forest, no mention is made here of other smaller communities within the respective zones. These will be remarked on later where necessary. It may be added that the various zones indicated are exemplified in the grass flora.

## Types of Vegetation.

Mangrove Zone. The maritime grasses are the first encountered at low levels. One of the most interesting of these is *Paspalum vaginatum* Swartz, which is found in certain places in the *Avicennia nitida* Jacq. mangrove association, where it inhabits the salt mud-flats, the rocky and sandy fore-shore, and the periodically flooded tidal level. In the salt water conditions it forms cushion-like domes with masses of finely developed roots which hold up fine particles of sand. Over the rocks above the tide it is of a clambering nature, and on the sandy shore, although it does not extend beyond a very narrow strip, it exhibits a pasture-like habit. At its landward limits it is found in the *Avicennia* association linked up with *Stenotaphrum secundatum* (Walt.) O. Kuntze, the St. Augustine grass of America, a species widely distributed on the sea-shores of West Africa.

Both these grasses, it is interesting to note, exhibit the thick, fleshy structure characteristic of halophytes and xerophytes, in contrast to the normal structure of neighbouring grasses which approach, but do not enter, the salt-marsh area.

PLATE VI.

*Sporobolus robustus* Kunth, clambering over rocky foreshore.

*Trichopteryx camerunensis* Stapf, growing over old lava flow, 8,000 ft. (2,460 m.).

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*Sporobolus robustus* Kunth and *Andropogon tectorum* Schum. are also found in rather unusual conditions on the sea-front, the former clambering over the rocks, and the latter on the edge of afforested cliffs almost within the tidal spray. These two grasses, however, will be discussed later with other species of the genus from the higher levels.

Rain-Forest Zone. On some parts of the gentle slopes to the sea-shore *Paspalum vaginatum* Swartz is joined by a closely allied species, *Paspalum conjugatum* Berg., which extends to the higher limits of the sub-zone at 3200 ft. (984 m.). At this altitude it enters largely into the composition of the pasture land about the Government station of Buea. It is a vigorous, matted grass, forming natural pastures wherever the shrubby and arboreal plants are kept down. It invades old cultivations, open spaces, and, about the villages where it is grazed by goats and sheep, it forms lawn-like stretches. In the damper positions at the coast *P. conjugatum* Berg. is often mixed with *Axonopus compressus* Beauv., known as the " carpet grass," but the latter may in places be found almost pure. It is of similar habit and behaves in much the same way as *P. conjugatum* Berg., but it is, however, very restricted in its distribution, as it does not extend much higher than a few hundred feet.

*P. conjugatum* Berg. and *Axonopus compressus* Beauv. are also found at these low levels in association with *Oplismenus hirtellus* Beauv. and *O. Burmanii* Beauv., but mostly about afforested areas or near shade. The two former being typical forest species, give place to the latter in the more shady places. The *Oplismenus* spp. have, however, been observed to persist for a time in the *P. conjugatum* Berg. and *Axonopus compressus* Beauv. communities in open land which had, until some years previously, been under forest.

It may be worthy of note that the inflorescences of *O. hirtellus* Beauv. are glandular and viscid, and, in places where it forms thick patches in open glades and during hot, moist weather, have been observed to give off the strange smell so peculiar to the " stink grass," *Melinis minutiflora* Beauv.

Both the species of *Oplismenus* are widely distributed and extend some way beyond the sub-zone. At a higher altitude their place is taken by a hairy form, the variety *simplex*, and the *forma robusta* Stapf of *O. hirtellus* Beauv., all of which are found along forest paths in glades at about 4500 ft. (1384 m.). The last form has larger spikes and stronger bristles than the type.

Ruderals are very well represented within the sub-zone and the well-known " guinea grass," *Panicum maximum* Jacq., is prominent among them. It behaves here in its normal way, invading old clearings, cultivations and roadsides, and may be found in pure stands of strong, luscious growth. Other ruderals occurring are *Digitaria horizontalis* Willd., *Chloris breviseta* Benth., *C. pycnothrix* Trin., *Eragrostis ovina* Hochst., *Eleusine indica* Gaertn., *Sporobolus Molleri* Hack., all of which inhabit gravelly places such as roadsides,

*Paspalum scrobiculatum* var. *Commersonii* Stapf, and *P. paniculatum* L., both invading old pastures, and *Pennisetum polystachyon* Schult., *Arthraxon Quartinianus* Nash., and *Rottboellia exaltata* L., which, like the " guinea grass," invade old clearings and cultivated lands.

The occurrence here of *P. paniculatum* L. is of interest, being a species widely known in Mexico, tropical America, and the West Indies, while its distribution on the west coast of Africa is rather local. Although a few stragglers have been observed as high as 3200 ft. (984 m.), it finds the conditions about sea-level more favourable, where in parts it is fairly common.

Of the ruderals enumerated only one, or perhaps two, would appear to be restricted to the higher limits of the sub-zone. These are *Arthraxon Quartinianus* Nash, and *Rhynchelytrum roseum* Stapf et Hubbard (*Tricholaena rosea* Nees), which, so far as observations go, occur only at about 3200 ft. (984 m.). Here the *Arthraxon* is a rambling grass forming pure patches about the sides of roads and in abandoned garden plots, or mixed with other grasses. During the height of the dry season it shows a heavy infestation of rust, which turns the patches brown and destroys the leaves, but not before the flowers are well advanced. This point is remarked on as the grasses of the Mountain are singularly free from fungal attack.

The *Rhynchelytrum* is not at all frequent and the gatherings so far made have been from around boulders in large clearings. The excessively moist conditions do not seem to favour it. In East Africa, where it is quite common and where the rainfall and humidity are very much less, it frequents dry, gravelly slopes, or is a ruderal in old cultivated areas.

Besides *Echinochloa pyramidalis* Hitch. et Chase, which has been observed only at low levels in swamp communities, mention may be made of *Brachiaria mutica* Stapf as one other grass confined to the sub-zone. It has been gathered on the edge of swamp along with the former; also on some adjoining elevated land near the sea, and in an elephant grass community at 3200 ft. (984 m.), occurring in dense patches some three or more feet deep. Those at the lower level are glabrous, whilst those of the higher possess hairy joints. It is a vigorous, spreading grass with tough stems.

With the exception of *B. plantaginea* Hitch., which was found on a stock farm, but considered to be an alien, this is the only *Brachiaria* so far recorded. This fact is significant, since the genus is represented by numerous species over a great part of Central Africa, and especially the Uganda Plateau.

There are two other grasses of the sub-zone which have so far not been discussed, the " elephant grass," *Pennisetum purpureum* Schum. and the " buffalo grass," *Setaria caudula* Stapf; they are not confined to the sub-zone, occurring as high as 4500 ft. (1384 m.). In the sub-zone the " elephant grass " occurs only sporadically along the mountain streams, about the edge of forests, bordering clearings, and almost to the sea-level, but at 3200 ft. (984 m.) it covers some

fairly extensive areas and evidently finds the conditions at this altitude very favourable, as it forms strong, dense growth. This grass having invaded deforested land, these areas are not stable and some of the older parts are now becoming overgrown by shrubs, such as species of *Maesa*, *Triumfetta*, *Millettia*, *Combretum*, *Tephrosia*, etc.—a transitionary stage in re-afforestation. This altitude would appear to be the most favourable for it, for on the great Uganda Plateau it covers miles of country at 3700 ft. (1140 m.) and extends over the greater part of the western slopes of the Ruwenzori Mountain up to 5000 ft. (1540 m.).

Within the " elephant grass " areas there are found other grass communities which are of interest, as, for instance, colonies of *Melinis minutiflora* x *M. tenuissima*, *Brachiaria mutica* Stapf, *Panicum brevifolium* L., and *Imperata cylindrica* var. *Thunbergii* Durand et Schinz. *Melinis minutiflora* Beauv. and *M. minutiflora* var. *inermis* Rendle have been observed at about 4500 ft. (1384 m.), but the other parent, *M. tenuissima* Stapf, has not so far been observed on the mountain by the writer.

*Setaria caudula* Stapf follows its normal behaviour here, growing about the edge of forests and in glades associated with herbs and bushes. At lower levels in some of the banana plantations which have been planted over deforested land, it is becoming a serious pest. The genus is further represented by the species *S. Chevalieri* Stapf and *S. barbata* Kunth, the former being similar to *S. caudula* Stapf, occupying much the same habitats, but having a spreading, lax inflorescence, with stiff, piercing hairs on the leaf-sheath. The latter is a rambling grass, rooting at the nodes, and frequenting damp places and the shade of trees.

There are two grasses which take up roughly a middle position in the rain-forest zone, both representative of the genus *Panicum*, *P. calvum* Stapf, and *Panicum* cf. *P. sublaetum* Stapf. *P. brevifolium* L. might well be included here too, although its limits appear to be somewhat narrower. The two former occur from 1000 ft. (308 m.) or 2000 ft. (616 m.) to about 4000 ft. (1232 m.) and frequent the edges of the forest, clearings and paths. They are trailing or clambering grasses and occur in pure patches when they have no neighbours over which to clamber. They form a link with the *Panicum monticolum* Hook. f. group, including *P. acrotrichum* Hook. f., and *P. Hochstetteri* Steud., which make their appearance at high altitudes. Here also is found another interesting forest grass, *Chloachne secunda* Stapf, which exhibits much the same characters as the Panicums.

The foregoing account gives some impression of the grasses of the rain-forest zone, but it should be noted that most of the species dealt with occur within the region of human habitation, and it is by reason of this that they appear as prominently as they do. Their existence is made easier by man having deforested large areas for cultivation and habitation, whereby competition with the larger components of the flora is for the time being restrained.

Cultivation by the native ceases about 4500 ft. (1384 m.) and with it the grasses. Closed forest mostly obtains, and grasses do not again appear until the limits of the rain-forest are reached at 6500 ft. (2000 m.).

Mountain Forest Zone. The rain-forest, with its fringe of mountain forest, forms an irregular band along the mountain slopes, extending from 6500 ft. (2000 m.) to 8500 ft. (2616 m.). In some places the mountain grassland pierces the mountain forest to the limits of the rain-forest zone, and here, fringing the forest, *Panicum Hochstetteri* Steud. is usually found with *P. acrotrichum* Hook. f. in glades and shady places. The former is found fringing the forest and the mountain grass-land as high as 8000 ft. (2460 m.), forming matted masses and clambering over bushes. It possesses extensive, thin, hard, wiry stems and narrow leaves.

The following observations on the genus *Panicum* as represented by the species recorded for this region may be of interest. With the exception of *Panicum maximum* Jacq., which is a strong-growing, erect plant with thick stems and large leaves, usually inhabiting open places, the species are of a trailing and clambering habit with extensive, thin, wiry stem development and small, narrow leaves. In the species *P. calvum* Stapf, *Panicum* cf. *P. sublaetum* Stapf and *P. brevifolium* L., which occur well within the rain-forest, the leaves are somewhat larger than those of *P. Hochstetteri* Steud. They become very reduced in the diminutive species *P. pusillum* Hook. f. which occurs sparingly in the mountain grass-land at 8000 ft. (2460 m.).

It is evident that the trailing and clambering habit assumed by these species of *Panicum* is a method of growth suited to forest or semi-forest conditions, as it enables them to grow more easily in search of light and advantage of position. The reduction in the leaf system of the species *P. Hochstetteri* Steud. and *P. pusillum* Hook. f. at the higher levels is compatible with the rarified air conditions and the extreme drought to which they are subject during the dry season.

In addition to the last two Panicums associated with the mountain forest zone there are two other grasses found in glades, with various herbs or in small colonies; namely, *Streblochaete longiaristum* Pilger and *Acritochaete Volkensii* Pilger. Like the Panicums they are trailing grasses with fairly extensive stem development. Their long, slender, barbed awns are peculiar in that they form a rope-like twist so that numbers of the spikelets are linked up and when ripe become detached from the spike in a bunch-like fashion. Both these grasses have been recorded from East Africa, the latter from Mts. Kilimanjaro, Elgon and Kenya.

In the more open parts and about the fringe of the mountain forest zone two species of *Bromus*, *B. scabridus* Hook. f. and *B. giganteus* L. occur, as well as several species of *Avenastrum*. The latter also appear sparingly in the neighbouring grass-land, and in

general appearance resemble the British *Arrhenatherum elatius* Mert. et Koch. The *Bromus* species have not so great a range, although *B. scabridus* Hook. f. has been gathered among bushes at 9200 ft. (2832 m.).

Mountain Grass-Land Zone. There is little or no transitionary bush stage from the forest limits to the mountain grass-land so that one passes as through a door-way from the forest. Very soon, especially on the main Eastern slopes, having passed through a narrow strip of *Panicum Hochstetteri* Steud., *Pennisetum monostigma* Pilger, and certain herbaceous plants, a belt of *Trichopteryx camerunensis* Stapf is encountered. It is a tussock grass subsisting on the thin soil of the windswept slopes, and during the dry season its browned culms and panicles of chestnut hue give them a characteristic colouring. In full leaf it appears as a continuous sward, but the grass fires during the dry season reveal its tussocky nature.

The approximate range of *T. camerunensis* Stapf is between 7000 ft. (2152 m.) and 8000 ft. (2460 m.), thus forming a narrow belt round the mountain. It is superseded by *Andropogon Mannii* Hook. f., *A. lima* Stapf, *A. distachyus* L., and *Andropogon* cf. *A. Dummeri* Stapf, which are a feature of the grass-land up to 10,000 ft. (3080 m.), with scattered tufts extending higher. As they occupy a higher level they are subject to more poverty-stricken conditions, occurring over great stretches of the old weathered lava fields. They have been gathered from ledges and holes in the scoriaceous rocks and boulders.

The association of *Andropogon* and *Trichopteryx* here suggests a reference to a similar association in East Africa, where, on the shores of the Victoria Nyanza in Uganda, *Trichopteryx kagerensis* K. Schum. and *Andropogon canaliculatus* Schum. are found. *A. Dummeri* Stapf is found also about the same region. The sandy soil of the Lake shore and the gravelly, laterite slopes approximate in some respects to the edaphic conditions of the Cameroons Mt., where the *Trichopteryx* and *Andropogon* exist. The genus *Trichopteryx* is represented here only in the species *T. camerunensis* Stapf, whereas in East Africa there are a number, ranging from the short *T. kagerensis* K. Schum. to the tall *T. superba* Baglietto. The several species of *Andropogon* recorded from the higher levels of the Mountain are all of similar growth, being tussock grasses with thin, straight flowering stems up to two feet or so, carrying from 2 to 3 brown spikes. There is, however, an exception in *A. abyssinicus* R. Br. gathered at 11,000 ft. (3384 m.), a small, annual species with short awns and light coloured, hairy spikes, but not so common as the others. These mountain species are in striking contrast to *A. tectorum* Schum., found near the sea-shore and already referred to—a grass of more ample dimensions, growing as high as 3 to 4 ft., with a multiple branching habit and carrying numerous spikes. It is found only sparingly in the afforested sub-zone, whilst in Sierra Leone it covers extensive areas in the open.

Within the mountain grass-land there are some favoured areas which might be described as orchard, inhabited by low trees and shrubs, namely *Aguaria salicifolia* Hook. f., *Hypericum lanceolatum* Lam., and *Adenocarpus Mannii* Hook. f. Such areas exist at the southern and northern ends on flats and gentle slopes from 8000 ft. (2460 m.) to 10,500 ft. (3230 m.). In the lower orchard areas the grass covering is of a heavier nature than elsewhere and is composed of a number of species, notably *Hyparrhenia Smithiana* Stapf and *Pennisetum monostigma* Pilger, besides *Trichopteryx* and *Andropogon*. The *Hyparrhenia* does not go much beyond 8000 ft. (2460 m.), keeping to the more favoured areas, but the *Pennisetum* is less fastidious, occurring not only on the edge of the forest around bushes in the orchard land, but even among scoriaceous rocks in the old lava flows, and is found as high as 9000 ft. (2768 m.). It is an interesting *Pennisetum* not only in this respect, but in the fact that it is a species almost confined to the Cameroons Mountain.

In places the mountain grass-land is intersected by more recent lava flows overlying the old and in various stages of deterioration, resulting in peculiar communities of plants within them. They are invaded by some of the grasses from the neighbouring grass-land, and although some of the species merely tolerate the conditions others would appear to be adapted to them. Besides *Pennisetum monostigma* Pilger, already referred to as occurring in the lava flows, one species of *Tripogon*, *T. major* Hook. f., also occurs frequently. Indeed it has been gathered from pure ashbeds on the slopes of some of the small craters. It is found only sparingly in the grass-land, about boulders and stones, and is of a xerophytic structure, with narrow, rolled leaves, thin, wiry flower stalks, carrying scaley *Lolium*-like spikes, of an unusual ashen colour. It is found between 8000 ft. (2460 m.) and 9000 ft. (2800 m.).

Another interesting grass found under identical conditions, but extending much higher, even up to 11,000 ft. (3384 m.), is *Sporobolus montanus* (Hook. f.) Engl. Its vegetative characters are also similar, being tufted, with thin flower stalks, carrying a loose panicle of dark-coloured spikes. It differs markedly in these respects from the species *S. robustus* Kunth and *S. indicus* R. Br. The former is a diffuse plant, thick-stemmed, and bearing robust, tail-like panicles. The plants of this species from the rocky fore-shore, it should be remarked, are of a clambering habit and short-jointed in contrast to the long-jointed, strong, erect habit of those from the Uganda plains, which appear to be its more natural habitat. The latter is found usually in favoured places and at lower levels—a leafy grass with an erect, open, graceful panicle. There is a form, however, which occurs scattered in the grass-land at about 7000 ft. (2152 m.), with a stiff, spike-like panicle.

At 8000 ft. (2460 m.) or even lower, some of the outposts of the upper grass-land are encountered, as, for example, *Aira caryophyllea* L., the well-known European species—here it is very light-

PLATE VII.

Arboreal limits at 10,700 ft. (3,292 m.) with *Adenocarpus Mannii* Hook. f. in foreground leading to pure grass-land.

A community of *Deschampsia* cf. *D. Mildbraedii* Pilger and *Festuca abyssinica* Hochst. in depression among lichen-covered lava, 12,500 ft. (3,846 m.).

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coloured in all its parts, delicate in structure, scattered but widely distributed, and frequent in pockets in the grass-land and old lava flows—*Koeleria convoluta* Hochst., allied to K. *cristata* Pers. of the northern and southern hemispheres, *Deschampsia* cf. *D. Mildbraedii* Pilger, *Agrostis*, *Festuca*, *Pentaschistis*, *Poa annua* L. and *P. leptoclada* Hochst.

The bush *Adenocarpus Mannii* Hook. f. finally ceases at 10,700 ft. (3292 m.). This is preceded on certain parts of the barren mountain slopes at 9000 ft. (2800 m.) to 10,000 ft. (3080 m.) by a community of *Aguaria salicifolia* Hook. f., *Hypericum lanceolatum* Lam., together with *Adenocarpus Mannii* Hook. f.; the grasses here are *Andropogon Mannii* Hook. f., *Agrostis Mannii* Stapf MS. (*Deyeuxia Mannii* Hook. f.), *Festuca abyssinica* Hochst., and *Deschampsia* cf. *D. Mildbraedii* Pilger. The last, with its ripened silvery panicles, is a striking feature over the boulder-strewn landscape.

Above 10,700 ft. (3292 m.) the vegetation becomes pure grass-land with certain herbaceous components, and *Deschampsia* and *Festuca abyssinica* Hochst. are prominent. This community continues along the sloping approaches to the peak, which become more and more thinly-clad and tussocky as the conditions become more and more desert, and finally ceases at about 12,500 ft. (3846 m.).

Alpine Desert Zone. On the steep rise to the main crater and the barren ash-covered cones which make up the peak the conditions become bleak and desert in the extreme, and it would be difficult to find a place more unfavourable to plant life. Nevertheless on the smooth, ashy slopes and on the very summit itself stunted and dried up plants of *Festuca Schimperiana* Nees and *Pentaschistis Mannii* Stapf MS. grow either in clumps or from low domes of moss. These, with *Senecio clarenceanus* Hook. f. and *Helichrysum Mannii* Hook. f., form the final plant community at 13,336 ft. (4100 m.) on this mountain mass.

For identifications of many of the grasses I am indebted to the Director of the Royal Botanic Gardens, Kew, with whom many of the specimens have been deposited; and to Dr. Turrill and Mr. C. E. Hubbard for suggestions regarding the preparation of this paper.

## LVII.—CONTRIBUTIONS TO THE FLORA OF SIAM.* – Additamentum XXXVI.

**Ixora betongensis** *Craib* [Rubiaceae-Ixoreae]; ab affini *I. merguense* Hook. f. foliis subtus haud glabris, nervis lateralibus magis numerosis inter alia recedit.

*Frutex* circa 1 m. altus (ex *Kerr*); ramuli validi, ad 8 mm. diametro, parum complanati, puberuli, brunneo-corticati, lenticellis parvis inconspicuis. *Folia* elliptica vel obovato-elliptica, apice acuminata, basi cuneata, 27–33 cm. longa, 12–14·3 cm. lata, subcoriacea, sicca viridia vel parum brunnescentia, supra glabra, subtus breviter hirsuta, costa supra impressa subtus prominente, nervis

*Continued from *K.B.* 1932, 338.

lateralibus utrinque circa 16 supra impressis subtus prominentibus intra marginem anastomosantibus, nervis transversis supra impressis subtus prominulis, margine recurva, petiolo 1·5 cm. longo valido supra late canaliculato suffulta ; stipulae deciduae. *Inflorescentia* terminalis, 7 cm. diametro, pedunculo communi brevi incluso 6 cm. longa, ramulis longius puberulis ; bracteae ad 4 mm. longae, cum bracteolis 2 mm. longis puberulae ; flores albi (ex *Kerr*), sessiles vel pedicello ad 1·5 mm. longo suffulti. *Receptaculum* 1 mm. longum, sicco fuscum, puberulum. *Calycis* segmenta 4, inter se subaequalia, oblongo-ovata, acuta vel acute acuminata, ad 2 mm. longa et 1·25 mm. lata, dorso puberula, ciliata. *Corollae* tubus extra puberulus, 2·8 cm. longus, lobi 8 mm. longi. *Antherae* 6 mm. longae, acuminatae, loculis basi inter se liberis, filamentis 1 mm. longis. *Stylus* gracilis, ad 3·3 cm. longus, stigmatibus 4 mm. longis.

Betong, 200 m., scrub jungle, *Kerr* 7639.

**Ixora bracteolata** *Craib* [Rubiaceae-Ixoreae] ; ab *I. lucida* R. Br. ex Hook. f. bracteolis receptaculo longioribus, corollae tubo extra glabro, ab *I. eugenioide* Pierre ex Pitard stipulis et calycis segmentis angustioribus, corollae tubo conspicue longiore distinguenda.

*Ramuli* graciles, primo compressi, puberuli, demum teretes, glabri, cortice brunneo obtecti, lenticellis haud conspicuis. *Folia* oblongo-oblanceolata, rarius elliptica vel ovata, apice subacuminata, summo apice apiculata, basi cuneata, late cuneata, vel rarius rotundata, 4–6·5 cm. longa, 1·8–3·2 cm. lata, chartacea, sicca supra subfusca, subtus brunnea, pagina utraque glabra, costa supra prominula subtus prominente, nervis lateralibus utrinque 8–10 tenuibus rectis supra conspicuis subtus prominulis intra marginem anastomosantibus, nervulis paucis pagina utraque plus minusve conspicuis, petiolo usque ad 5 mm. longo primo puberulo supra canaliculato suffulta ; stipulae subulatae, ad 5 mm. longae, puberulae. *Inflorescentia* terminalis, corymbosa, circa 3 cm. longa, et rhachi et ramulis puberulis, articulata ; bracteae angustae, ad 3 mm. longae ; pedicelli usque ad 2·5 mm. longi, apice bracteolis duabus angustis receptaculo paulo longioribus instructi ; alabastra acuminata, apice demum paulo stellulata. *Receptaculum* 1 mm. longum, glabrum. *Calycis* tubus brevis, segmenta 2 mm. longa, 0·75 mm. lata, glabra. *Corollae* tubus 1 cm. longus, extra glaber, lobi 4, circa 4 mm. longi.

Krat, Ta Kum, *Put* 2887.

**Ixora brevidens** *Craib* [Rubiaceae-Ixoreae] ; ab affini *I. Brunonis* Wall. ex G. Don foliis subtus indumento brevi instructis, calycis segmentis multo brevioribus inter alia recedit.

*Ramuli* annotini compressi, crassi, breviter hirsuti. *Folia* elongato-obovato-elliptica, apice acuminata, basi cuneata, obtusa, 18–32 cm. longa, 9·5–11·5 cm. lata, chartacea, sicca parum fuscescentia, subtus pallidiora, supra ad costam et saepe etiam ad nervos laterales puberula, subtus breviter subsparse pubescentia, costa

subtus prominente, nervis lateralibus utrinque 15–17 supra conspicuis subtus prominentibus intra marginem anastomosantibus, nervis transversis supra plus minusve conspicuis subtus prominulis, petiolo 5 mm. longo breviter hirsuto supra canaliculato suffulta ; stipulae e basi deltoidea subulato-acuminatae, 1 cm. longae, dorso medio carinatae, breviter hirsutae. *Infructescentia* terminalis, 2–2·5 cm. longa, e basi ramosa vel pedunculo communi ad 1 cm. longo suffulta, breviter hirsuta vel longius puberula. *Fructus* seminibus solitariis ellipsoideus vel geminis subrotundatus et parum compressus, ad 1 cm. diametro, calcyis segmentis oblongo-deltoideis circa 1·25 mm. longis erectis dorso breviter pubescentibus ciliatis diu coronatus.

Prachuap, Hui Yang, *Put* 3253.

**Ixora ebarbata** *Craib* [Rubiaceae-Ixoreae] ; ab affini *I. lucida* R. Br. ex Hook. f. corollae oculo glabro inter alia differt.

*Frutex* circa 4 m. altus (ex *Kerr*), inflorescentia excepta glaber ; ramuli subgraciles, iuventute sicco fusci, compressi, mox teretes, cortice cinnamomeo obtecti, lenticellis haud conspicuis. *Folia* oblonga, oblongo-obovata, vel elliptica, apice breviter obtuse acuminata, basi cuneata vel rotundato-cuneata, 4·5–11 cm. longa, 2–4 cm. lata, chartacea, sicco atra, costa supra conspicua subtus prominente, nervis lateralibus utrinque circa 10 supra saepissime impressis subtus prominulis intra marginem anastomosantibus, nervulis pagina utraque subprominulis, petiolo usque ad 1 cm. longo supra anguste canaliculato suffulta ; stipulae subulato-acuminatae, circa 4 mm. longae. *Inflorescentia* terminalis, corymbiformis, pedunculo communi ad 1·5 cm. longo et floribus inclusis ad 4·5 cm. longa, laxiflora, ramulis lateralibus utrinque 2 inferioribus circa 7 mm. longis, partibus omnibus puberula ; flores albi (ex *Kerr*), terminalibus saepissime sessilibus, lateralibus pedicello circa 3 mm. longo suffultis ; bracteae angustae, inferioribus ad 3 mm. longis ; bracteolae binae, ad pedicelli apicem positae, circa 0·5 mm. longae. *Receptaculum* puberulum, 1 mm. longum. *Calycis* lobi tubo paululo longiores, deltoidei vel suboblati, circa 0·5 mm. longi et 0·75 mm. lati, fere glabri. *Corollae* tubus gracilis, extra puberulus, 2·5 cm. longus, lobi 4, mox arcte reflexi, vix 6 mm. longi. *Antherae* 3·25 mm. longae, apice acute acuminatae, loculis basi productis, filamentis 1 mm. longis.

Ranawng, Kao Talu, 50 m., evergreen forest, *Kerr* 11,829.

**Ixora kratensis** *Craib* [Rubiaceae-Ixoreae] ; ab affini *I. Brunonis* Wall. ex G. Don foliis petiolatis, et calycis segmentis et corollae lobis brevioribus inter alia recedit.

*Frutex* circa 2 m. altus (ex *Kerr*) ; ramuli primo densius hirsuti, mox parum glabrescentes. *Folia* saepissime oblonga vel suboblonga, apice acute acuminata, basi truncata vel rotundato-truncata, 15–21 cm. longa, 4·5–6·5 cm. lata, chartacea, sicco brunnea, subtus pallidiora, supra ad costam primo hirsuta, mox plus minusve

glabrescentia, aliter primo sparse hirsuta, cito glabrescentia, subtus hirsuta, pilis haud densis, costa supra conspicua subtus prominente, nervis lateralibus utrinque 12–15 intra marginem anastomosantibus supra parum impressis subtus prominentibus, nervulis rete laxum supra subconspicuum subtus subprominulum efficientibus, margine revoluta, primo ciliata, petiolo 8–12 mm. longo dense hirsuto supra canaliculato suffulta ; stipulae subulatae, 1 cm. longae, hirsutae, diu persistentes. *Inflorescentia* terminalis, corymbiformis, pedunculo communi circa 1 cm. longo incluso 2·5–5·5 cm. longa, 5–9 cm. diametro, partibus omnibus hirsuta ; flores albi (ex *Kerr*), subsessiles vel pedicellis ad 2 mm. longis suffulti ; bracteolae 2, sub receptaculo, circa 1 mm. longae. *Receptaculum* circa 1 mm. longum, pilis paucis instructum. *Calycis* segmenta 4, lanceolata, subacuta, 1·75 mm. longa, hirsuto-ciliata. *Corolla* extra subsparse pilosa, ante anthesin apice fusiformis ; tubus 3 cm. longus, intra glaber ; lobi 4, spatulato-elliptici, 7 mm. longi, 3 mm. lati. *Stamina* 4, filamentis 2·5 mm. longis ad corollae tubi apicem adfixis, antheris circa 3·5 mm. longis, connectivo excurrente acuminatis. *Stylus* filiformis, 3 cm. longus, glaber, stigmatibus binis circa 2 mm. longis. *Fructus* ellipsoideus vel late ellipsoideus, ad 11 mm. longus et 8 mm. diametro, pilis paucis instructus, calyce persistente coronatus.

Krat, Baw Rai, 600 m., common in evergreen forest, *Kerr* 9473.

**Ixora Lakshnakarae** *Craib* [Rubiaceae-Ixoreae] ; ab *I. betongense* Craib calycis segmentis conspicue longioribus distinguenda.

*Frutex*, ramulis iuventute compressis subhirsutis magis minusve fuscis demum cinereo-corticatis. *Folia* elliptica vel anguste elliptica, apice acutius subacuminata, basi cuneata vel late cuneata, ad 30 cm. longa et 11·5 cm. lata, coriaceo-chartacea, sicco supra viridia vel subviridia, subtus pallidiora, supra glabra, subtus hirsuta, costa supra medio sulcata subtus prominente, nervis lateralibus utrinque circa 20 supra impressis subtus prominentibus intra marginem anastomosantibus, nervis transversis supra impressis subtus prominulis, petiolo usque ad 1·5 cm. longo hirsuto suffulta ; stipulae e basi lata subulato-acuminatae, ad 1·5 cm. longae, basi connatae, dorso hirsutae. *Corymbi* terminales, e basi ramosi, floribus inclusis ad 15 cm. longi et lati, ramulis lateralibus utrinque 3–4 cum pedunculis hirsutis ; bracteae inferiores foliaceae, ad 13 mm. longae, superiores gradatim minores, supremae 8 mm. longae ; pedicelli ad 4 mm. longi, apice bracteolis duabus late oblanceolatis 7 mm. longis 2·5 mm. latis instructi, hirsuti ; flores albi (ex *Lakshnakara*). *Receptaculum* 2 mm. longum, pubescens. *Calycis* segmenta 4, inter se aequalia, oblongo-oblanceolata, 7 mm. longa, 2·75 mm. lata, foliacea, ciliata. *Corollae* tubus 3·7 cm. longus, extra parce subpilosus, lobi 1 cm. longi, fere 4 mm. lati. *Antherae* 6 mm. longae.

Tomo, Ban Wo, 180 m., by stream, *Lakshnakara* 688.

**Ixora Parkinsoniana** *Craib* [Rubiaceae-Ixoreae] ; ab *I. opaca* R. Br. ex G. Don foliis latioribus, pedunculo elongato, et receptaculo et corolla extra conspicue puberulis recedit.

*Frutex* circa 2 m. altus (ex *Kerr*) ; ramuli glabri, primo compressi, mox cortice cinereo vel brunneo-cinereo tecti, lenticellis haud conspicuis. *Folia* suboblonga, elliptica, late elliptica, vel rarissime rotundata, apice obtusa, basi cuneata, late cuneata, vel rotundata, 7–15 cm. longa, 3·8–8·5 cm. lata, coriacea vel subcoriacea, sicco subviridia, subtus parum pallidiora, pagina utraque glabra, costa supra conspicua vel parum impressa subtus prominente, nervis lateralibus utrinque 7–10 supra subprominulis subtus prominentibus intra marginem anastomosantibus, nervulis rete gracile pagina utraque conspicuum efficientibus, margine revoluta, petiolo 1–2 cm. longo supra canaliculato suffulta ; stipulae subulatae, ad 5 mm. longae, diutius persistentes. *Inflorescentia* pendula (ex *Kerr*), floribus inclusis circa 3 cm. longa et 6 cm. diametro, pedunculo communi ad 17 cm. longo sparse puberulo paululo supra basem bracteato suffulta, articulata, puberula, bracteis ad 2·5 mm. longis, floribus albis (ex *Kerr*), terminalibus sessilibus, lateralibus pedicellis ad 2 mm. longis apice bracteolis duabus circa 0·75 mm. longis instructis suffultis ; alabastra obtusa. *Receptaculum* vix 1 mm. longum, dense puberulum. *Calycis* segmenta subquadrata, 0·5 mm. longa, ciliolata, dorso puberula. *Corollae* tubus 1·8 cm. longus, extra densius longius puberulus, lobi 4, oblongo-obovati, 4 mm. longi, 2·5 mm. lati, dorso puberuli, ciliolati. *Antherae* dorsifixae, 3 mm. longae, apiculatae, filamentis ad corollae tubi apicem positis circa 1·25 mm. longis.

Yanyao, 50 m., evergreen forest, *Kerr* 18,170.

**Ixora straminea** *Craib* [Rubiaceae-Ixoreae] ; ab *I. lucida* R. Br. ex Hook. f. inflorescentia glabra, alabastris haud longe acuminatis inter alia recedens.

*Frutex* circa 4 m. altus (ex *Kerr*) ; ramuli graciles, glabri, sicco primo fusci, compressi, mox straminei, teretes, lenticellis parvis haud conspicuis. *Folia* oblanceolata vel lanceolata, apice acute acuminata, basi cuneata vel obtuse cuneata, 6·5–10·5 cm. longa, 1·7–2·8 cm. lata, chartacea, sicco atra, pagina utraque glabra, costa supra conspicua subtus prominente, nervis lateralibus utrinque circa 12 pagina utraque prominulis, nervulis rete gracile pagina utraque efficientibus, margine anguste cartilaginea saepe parum recurva, petiolo ad 5 mm. longo glabro supra canaliculato suffulta ; stipulae basi inter se breviter connatae, e basi lata subulato-acuminatae, 2·5–4·5 mm. longae, glabrae, primo fuscae, mox stramineae, diutius persistentes. *Inflorescentia* terminalis, corymbosa, pedunculo communi circa 3 mm. longo et corollis inclusis ad 3·5 cm. longa et 5·5 cm. lata, glabra, articulata ; ramuli laterales utrinque 3, circa 4 mm. longi, basi bracteis angustis 2 mm. longis instructi, partiales ad 3 mm. longi ; flores albi (ex *Kerr*), terminalibus sessilibus, lateralibus pedicellis ad 2 mm. longis apice bracteolis duabus 0·75 mm. longis instructis suffultis ; alabastra primo acuta, subacuminata. *Receptaculum* 1 mm. longum. *Calycis* segmenta 0·75 mm. longa, 0·5 mm. lata. *Corollae* tubus gracilis, 2 cm. longus, lobi 4,

elliptici vel oblongo-elliptici, subacuminati, subacuti, 4 mm. longi, 1·75 mm. lati. *Antherae* dorsifixae, 3 mm. longae, acutae, loculis basi productis, filamentis ad corollae tubi apicem positis 1 mm. longis. *Stylus* gracilis, paulo exsertus.

Trang, Kao Sung, 800 m., evergreen forest, *Kerr* 15,233.

**Duperrea scabrida** *Craib* [Rubiaceae-Ixoreae] ; a *D. pavettifolia* (Kurz) foliis subtus scabridulis haud molliter pubescentibus cognoscenda.

*Ramuli* graciles, primo subadpresse hirsuti, mox glabri, cinnamomeo-corticati, lenticellis inconspicuis. *Folia* opposita, paribus haud rarius inter se inaequalibus, saepissime oblanceolata vel oblongo-oblanceolata, apice acute acuminata, basi cuneata, ad 15 cm. longa et 5 cm. lata, sicca fusco-brunnea, chartacea, pagina superiore setulis adpressis hic et illic instructa, inferiore ad costam nervosque laterales setis brevibus adpressis scabridula, costa supra conspicua subtus prominente, nervis lateralibus utrinque ad 10 supra conspicuis subtus prominulis, nervulis rete laxum pagina utraque subconspicuum efficientibus, setuloso-ciliata, petiolo 4–10 mm. longo adpresse setuloso supra canaliculato suffulta ; stipulae subulato-acuminatae, ad 6 mm. longae, scariosae, dorso parce adpresse setulosae, diutius persistentes. *Inflorescentia* corymbiformis, pedunculo communi 2 cm. longo et floribus inclusis ad 7 cm. longa et 6 cm. lata, pedunculo ramulis et pedicellis subadpresse hirsutis ; bracteae angustae, ad 4 mm. longae ; pedicelli ad 5 mm. longi. *Receptaculum* 1·5 mm. longum, subsparse adpresse hirsutum. *Calycis* tubus 0·5 mm. longus, segmenta subulata, 5 mm. longa, hirsuta. *Corollae* tubus extra adpresse hirsutus, 2 cm. longus, lobi 5, subrotundati, breviter acuminati, circa 4 mm. diametro, primo hirsuto-ciliati, dorso apice pilis paucis rigidis instructi. *Antherae* 3·25 mm. longae, filamentis brevibus ad corollae tubi apicem insertis. *Stylus* 3 cm. longus, parce breviter pubescens, stigmate fusiformi carnoso.

Krat, Ta Kum, *Put* 2889.

**Pavetta aspera** *Craib* [Rubiaceae-Ixoreae] ; ab affini *P. nervosa* Craib calycis lobis deltoideis inter alia distinguenda.

*Ramuli* annotini scaberuli, teretes, circa 3 mm. diametro. *Folia* saepissime oblongo-oblanceolata, apice obtuse acuminata vel subacuminata, basi attenuato-cuneata, 11–18 cm. longa, 2·7–6 cm. lata, chartacea, sicco subviridia, subtus parum pallidiora, matura supra ad costam scaberula, subtus scaberula, costa supra conspicua subtus prominente, nervis lateralibus utrinque 10 supra plus minusve conspicuis subtus prominentibus, nervulis rete gracile subtus subconspicuum efficientibus, petiolo 1–2 cm. longo scaberulo suffulta ; stipulae ad 8 mm. longae, subulato-acuminatae. *Corymbi* terminales, foliati, iis *P. indicae* Linn. similes, floribus inclusis usque ad 20 cm. lati, densius crispatim puberuli ; pedicelli circa 5 mm. longi ; flores albi (ex *Put*). *Receptaculum* 1 mm. longum, densius subadpresse longe puberulum. *Calyx* receptaculo paululo longior, fere

ad medium lobatus, extra longe puberulus, lobis deltoideis ciliolatis. *Corollae* tubus 2·7 cm. longus, extra glaber, lobi 4, oblongo-elliptici, 6 mm. longi, 2·75 mm. lati. *Antherae* 6 mm. longae, filamentis brevibus. *Stylus* 5 cm. longus.

Krat, Ta Kum, *Put* 2881.

**Pavetta brevituba** *Craib* [Rubiaceae-Ixoreae]; a *P. indica* Linn. foliis subtus breviter hispidulis, corollae tubo breviore distinguenda.

*Frutex* circa 1 m. altus (ex *Kerr*); ramuli primo fusci, breviter sparse scaberuli, mox pallidi, glabri, lenticellis haud conspicuis. *Folia* lanceolata, oblanceolata, vel oblongo-oblanceolata, apice acute acuminata, basi cuneata, 3·5–7·5 cm. longa, 1·2–2·9 cm. lata, chartacea, sicco subviridia, subtus parum pallidiora, pagina superiore primo sparse breviter setulosa, inferiore breviter hispidula et saepissime in nervorum axillis pilosa, costa supra conspicua subtus prominente, nervis lateralibus utrinque circa 6 subtus prominulis, nervulis vix conspicuis, petiolo 4–10 mm. longo breviter hispidulo suffulta; stipulae ad 4 mm. longae. *Inflorescentia* corymbiformis, terminalis, pedunculo communi brevi et floribus inclusis circa 2 cm. longa et 3·5 cm. lata, rhachi ramulis et pedicellis sicco atris breviter albo-hirsutis; pedicelli ad 4 mm. longi, floribus albis (ex *Kerr*). *Receptaculum* 0·75 mm. longum, sparse hispidulo-puberulum. *Calycis* tubus receptaculo subaequilongus, dorso extra subglaber, lobi 4, deltoidei, obtusi, 0·5 mm. longi, dorso subglabri vel hispidulo-puberuli, ciliati. *Corollae* tubus 7 mm. longus, extra glaber, lobi 4, oblongi vel late elliptici, ad 4 mm. longi et 2·5 mm. lati, glabri. *Antherae* 4·25 mm. longae, filamentis brevibus ad corollae tubi os adfixis. *Stylus* 1·8 cm. longus.

Prachuap, Ban Nawng Kang, under 50 m., evergreen forest, *Kerr* 10,908.

**Pavetta fruticosa** *Craib* [Rubiaceae-Ixoreae]; a *P. tomentosa* Roxb. ex Sm. statura minore, foliis subtus haud tomentosis inter alia recedens.

*Frutex* ad 1 m. altus (ex *Kerr*); ramuli nisi ad nodos glabri, obtuse quadrangulares, ad 6 mm. diametro, rubro-corticati, lenticellis parvis inconspicuis. *Folia* obovata, anguste obovata, vel suboblonga, apice rotundata, saepe parum retusa et apiculata, basi cuneata, sub anthesin ad 6 cm. longa et 2·5 cm. lata, rigide chartacea, sicca brunnescentia, pagina superiore pilis brevibus adpressis sparse instructa, inferiore ad costam nervos nervulosque similiter instructa, costa supra conspicua subtus prominente, nervis lateralibus utrinque usque ad 12 supra conspicuis subtus prominulis, nervis transversis supra subconspicuis subtus subprominulis, margine ciliolata, petiolo ad 7 mm. longo pilis brevibus adpressis primo sparse instructo supra canaliculato suffulta; stipulae variabiles, scariosae, late deltoideae, oblongae, vel transverse oblongae, cuspidato-acuminatae, ad 7 mm. longae. *Corymbi* terminales, sessiles, floribus inclusis 6–8 cm. longi, 9–11 cm. lati, foliati, rhachi et ramulis primo pilis paucis instructis

glabrescentibus sicco fuscis ; pedicelli ad 6 mm. longi, bracteis parvis ; flores albi (ex *Kerr*). *Receptaculum* circa 1 mm. longum, puberulum, sicco fuscum. *Calycis* tubus receptaculo subaequilongus, dorso puberulus, lobi breves, pallide marginati, ciliolati. *Corollae* tubus 1·1 cm. longus, extra glaber, intra superne pilosus, lobi 4, oblongi, 6·5 mm. longi, 2·25 mm. lati, pallide marginati, supra basi pilis paucis instructi. *Antherae* 5 mm. longae, filamentis brevibus. *Stylus* 2·5 cm. longus, medio sparse pubescens.

Doi Sutep, 300–600 m., deciduous forest, *Kerr* 1149.

**Pavetta nervosa** *Craib* [Rubiaceae-Ixoreae] ; a *P. indica* Linn. eiusque affinioribus ramulis scaberulis, a *P. siphonantha* Dalz., cui habitu subsimilis, calycis lobis multo brevioribus inter alia recedit.

*Ramuli* scaberuli, sicco primo compressi, subfusci, mox teretes, cortice cinnamomeo obtecti, lenticellis haud conspicuis. *Folia* saepissime oblongo-ovata, oblongo-obovata, vel late oblanceolata, apice obtuse acuminata vel subacuminata, basi cuneata vel late cuneata, interdum acuminata, usque ad 16 cm. longa et 6 cm. lata, rigide chartacea, sicco brunnescentia et plus minusve fuscescentia, pagina utraque praecipue ad costam sparse subscaberulo-puberula, costa supra conspicua subtus prominente, nervis lateralibus utrinque 9–12 supra conspicuis subtus prominentibus, nervulis pagina utraque conspicuis vel paucis inferiore prominulis, petiolo 1–2·5 cm. longo scaberulo suffulta ; stipulae basi connatae, 8 mm. longae. *Inflorescentia* ei *P. indicae* Linn. similis sed parcius puberula ; flores albi (ex *Put*), pedicellis circa 5 mm. longis suffulti. *Receptaculum* 1 mm. longum, fere glabrum. *Calycis* tubus 0·5 mm. longus, dentes breves. *Corollae* tubus 1·7 cm. longus, extra glaber, intra, basi excepta, subpilosus, lobi 4, circa 5 mm. longi et 2·5 mm. lati, supra basem versus pilis paucis instructi. *Antherae* 5 mm. longae, filamentis brevibus. *Stylus* 3·7 cm. longus.

Kaw Pangan, *Put* 807.

**Pavetta petiolaris** *Wall. mss.* [Rubiaceae-Ixoreae] ; *P. indicae* Linn. valde affinis a qua foliis pro rata saepissime longioribus apice distincte acuminatis supra ad nervos pilis crispatis praetereaque aliter setis sparsis instructis distinguenda.

*Arbuscula* vel *frutex* (ex *Garrett*) ; ramuli glabri, primo fusci, angulati, annotini cinereo-corticati. *Folia* anguste elliptica vel oblanceolata, apice acute acuminata, basi attenuato-cuneata, 11–18 cm. longa, 2·7–5·8 cm. lata, chartacea, sicco parum brunnescentia, subtus pallidiora, supra ad nervos sed praesertim ad costam pilis saepissime crispatis subsparse instructa praetereaque aliter setis hic et illic instructa, subtus ad costam nervosque breviter crispatim pubescentia, costa supra conspicua subtus prominente, nervis lateralibus utrinque circa 9 supra conspicuis subtus prominulis, reticulatione gracili pagina utraque plus minusve subconspicua, petiolo 10–15 mm. longo suffulta. *Inflorescentia* corymbosa, sessilis, floribus inclusis 5 cm. longa et 10 cm. lata, ramulos laterales

circa 7 cm. longos apice bifoliatos aliter nudos terminans, rhachi ramulis et pedicellis breviter crispatim pubescentibus ; pedicelli ad 5 mm. longi. *Receptaculum* circa 1 mm. longum, breviter crispatim pubescens. *Calycis* tubus receptaculo paulo brevior, extra subglaber, dentes 4, breves. *Corollae* tubus 1 cm. longus, extra glaber, intra apicem versus pilosus, lobi 4, circa 5 mm. longi, glabri. *Antherae* 5 mm. longae, filamentis brevibus ad corollae tubi apicem insertis. *Stylus* 2·5 cm. longus.

Doi Angka, E. slope, Mê Ka Pak drainage, 1450 m., *Garrett* 504.

**Pavetta pilosa** *Craib* [Rubiaceae-Ixoreae] ; a *P. naucleiflora* R. Br. ex G. Don foliis latioribus brevius petiolatis, calycis segmentis conspicue longioribus, corolla extra pilis albis longiusculis divaricatis sat dense instructa recedens.

*Ramuli* sat dense hirsuti, circa 3 mm. diametro. *Folia* oblonga, oblongo-lanceolata, vel elliptica, apice acute acuminata, basi saepe parum inaequilateralia, rotundata vel cuneata, 11·5–21 cm. longa, 4·3–7·7 cm. lata, sicca supra fusco-brunnea vel fusco-viridia, subtus fusco-grisea, chartacea, supra sparse hirsuta, subtus longius et mollius hirsuta pilis ad costam nervos nervulosque patulis, costa supra impressa subtus prominente, nervis lateralibus utrinque 12 supra impressis subtus prominulis, nervulis supra plus minusve impressis subtus subprominulis, ciliata, petiolo ad 1 cm. longo hirsuto suffulta ; stipulae subulatae, ad 1·5 cm. longae, breviter hirsutae. *Inflorescentia* terminalis, pedunculo communi 1·5–2·5 cm. longo, corymbiformis, 3–4 cm. longa, 5–6 cm. diametro, densiflora, pedunculo et ramulis hirsutis ; bracteae inferiores lineari-lanceolatae vel lineares, ad 1·3 cm. longae ; pedicelli ad 5 mm. longi, medio bracteolis duabus angustis 2 mm. longis hirsutis instructi. *Receptaculum* late ellipsoideum, 1·5 mm. longum, dense hirsutum. *Calycis* tubus 0·75 mm. longus, dorso hirsutus, lobis angustis subaequilongus. *Corollae* tubus 1 cm. longus, extra pilis divaricatis longius hirsutus, intra parte dimidia inferiore glaber, superiore subpilosus, lobi 5, oblongi, 5·5 mm. longi, 2 mm. lati, infra longius hirsuti, supra glabri. *Antherae* 7 mm. longae, apiculatae, subsessiles. *Stylus* cum stigmatibus 1·8 cm. longus, medio breviter pilosus.

Krat, Kao Saming, *Put* 534.

**Morinda cinnamomea** *Craib* [Rubiaceae-Morindeae] ; a *M. villosa* Hook. f. foliis minoribus, nervis lateralibus intra marginem haud anastomosantibus, nervis transversis obscuris, a *M. Scortechinii* (King et Gamble) et *M. cochinchiense* DC. ramulorum indumento multo densiore recedit.

*Frutex* volubilis (ex *Kerr*) ; ramuli dense molliter cinnamomeo-subpilosi. *Folia* oblonga, anguste oblonga vel oblanceolato-oblonga, apice subacute acuminata, basi cuneata vel rotundata, usque ad 9 cm. longa et 3·2 cm. lata, chartacea, sicca supra fusca, subtus pallidiora, supra ad costam densius subadpresse ferrugineo-pubescentia, aliter plus minusve glabrescentia, primo sparse subhirsuta,

subtus ad costam nervosque laterales adpresse pallide fulvo-sericea, aliter subpilosa, costa supra conspicua subtus prominente, nervis lateralibus utrinque 10–12 supra vix conspicuis subtus prominentibus, nervis transversis paucis subtus conspicuis, margine ciliata, petiolo 5–10 mm. longo indumento ei ramulorum simili tecto suffulta; stipulae diu persistentes, connatae, ad 9 mm. longae. *Pedunculi* terminales, ad 8, umbellatim dispositi, circa 5 mm. longi, dense subfulvo-pubescentes, 5-flori; alabastra sicco fusca, extra longius pubescentia. *Receptacula* inter se connata. *Calyx* 0·75 mm. longus, 4-lobulatus. *Corolla* 5 mm. longa, tubo brevi, lobis 4 oblongo-oblanceolatis intra pilis erectis dense barbatis. *Antherae* 0·75 mm. longae, filamentis 1 mm. longis. *Stylus* glaber, stigmatibus duobus inclusis 4·5 mm. longus; ovarium biloculare, ovulis solitariis.

Satul, Kao Keo Range, 700 m., evergreen forest, *Kerr* 14,551.

**Morinda longifolia** *Craib* [Rubiaceae-Morindeae]; a *M. aspera* Wight et Arn. foliis angustioribus, stipulis haud alte bifidis recedit.

*Frutex* circa 1·75 m. altus (ex *Kerr*); ramuli compressi, primo asperuli, fusci, mox cortice stramineo obtecti. *Folia* sublanceolata, apice obtusa, basi cuneata, ad 17 cm. longa et 3 cm. lata, chartacea, sicca supra fusca, subtus pallidiora, pagina utraque pilis brevibus asperula, costa supra conspicua subtus prominente, nervis lateralibus utrinque circa 15 pagina utraque plus minusve conspicuis, nervulis paucis subtus subconspicuis, asperulo-ciliolata, petiolo ad 5 mm. longo asperulo suffulta; stipulae deltoideae vel late deltoideae, 3–5 mm. longae, brunneae, dorso asperulae. *Capitula* oppositifolia, pedunculo communi 7–10 mm. longo asperulo suffulta. *Receptacula* connata. *Calyx* brevis, truncatus. *Corolla* alba (ex *Kerr*), ante anthesin inferne subglabra, superne conspicue asperulo-puberula; tubus circa 1·1 cm. longus, intra superne pilosus; lobi 5, circa 7 mm. longi et 2 mm. lati, supra glabri. *Antherae* 4 mm. longae, ad corollae tubi apicem attingentes, filamentis brevibus. *Stylus* 1·4 cm. longus, glaber, stigmatibus duobus 3–4 mm. longis; loculi duo, ovulis solitariis.

Rahêng, 100 m., cultivated, *Kerr* 4577.

**Morinda nana** *Craib* [Rubiaceae-Morindeae]; a *M. persicifolia* Ham. eiusque affinioribus foliis minoribus, inflorescentia parva recedit.

*Frutex* nanus; ramuli prostrati vel erecti (ex *Kerr*), scaberuli, circa 2·5 mm. diametro. *Folia* variabilia, saepissime obovata, oblongo-ovata, elliptica, vel fere rotundata, interdum medio constricta, apice rotundata vel obtusa, basi cuneata, ad 2·8 cm. longa et 1·3 cm. lata, chartacea, sicca viridia vel subviridia, subtus pallidiora, glabra, costa supra conspicua vel prominula subtus prominente, nervis lateralibus utrinque 4–5 intra marginem anastomosantibus pagina utraque subconspicuis, nervulis vix conspicuis, petiolo ad 3 mm. longo lamina decurrente plus minusve alato suffulta; stipulae circa 1 mm. longae, apice saepissime bilobatae. *Inflorescentia*

terminalis vel pseudoterminalis, corollis exclusis 3 mm. diametro, subsessilis vel breviter pedunculata, floribus circa 5–7 albis (ex *Kerr*). *Receptacula* inter se fere libera. *Calycis* tubus brevis, apice truncatus, sat carnosus. *Corolla* extra puberula ; tubus 6·5 mm. longus, intra apicem versus parce pilosus ; lobi 5, oblongo-lanceolati, 4 mm. longi, 1·5 mm. lati. *Stamina* inclusa vel exserta, filamentis 1·25 mm. longis, antheris 2 mm. longis. *Stylus* 9 mm. longus, apicem versus pilis brevibus instructus, stigmatibus duobus 1·5 mm. longis ; loculi duo, ovulis solitariis.

Nakawn Panom, Ta Uten, 200 m., very common along banks of streams, *Kerr* 8461.

**Morinda pumila** *Craib* [Rubiaceae-Morindeae] ; a speciebus aliis capitulis solitariis ob caules annuos breves distinguenda.

*Caules* e radice lignosa annui (ex *Kerr*), 10–30 cm. alti, erecti, simplices vel parce ramosi, subhirsuti, primo fusci, glutinosi, mox pallide virides. *Folia* saepissime elliptica vel oblongo-elliptica, apice breviter obtuse acuminata, basi cuneata vel acuminata, 4·5–8·5 cm. longa, 1·5–3·5 cm. lata, rigide chartacea, sicca supra plus minusve murina, subtus pallidiora, praesertim ad nervos supra breviter hirsuta, subtus hirsuta, costa supra conspicua subtus prominente, nervis lateralibus utrinque 7–9 supra conspicuis subtus prominulis saltem supremis intra marginem anastomosantibus, nervis transversis subtus subprominulis, densius ciliolata, petiolo ad 5 mm. longo hirsuto suffulta ; stipulae circa 2 mm. longae, diutius persistentes. *Pedunculi* axillares vel oppositifolii, 0·8–3 cm. longi. *Receptacula* inter se connata. *Calyx* brevissimus, truncatus. *Corolla* haud visa.

Chaiyapum, Pak Pang, 200 m., deciduous forest, *Kerr* 19,981.

**Morinda scabrida** *Craib* [Rubiaceae-Morindeae] ; a *M. angustifolia* Roxb. foliis maturis sicco viridibus subtus molliter pubescentibus recedit.

*Frutex* ad 1 m. altus (ex *Kerr*) ; ramuli iuventute quadrangulares, primo hirsuti, cito pilorum basibus induratis persistentibus scabridi, brunnei, lenticellis inconspicuis. *Folia* oblongo-oblanceolata vel subelliptica, apice acuminata vel subacuminata, basi longe cuneata, 14–21 cm. longa, 3–6 cm. lata, rigide chartacea, sicca supra viridia vel parum lutescentia, subtus pallide viridia, supra scabrida, subtus molliter pubescentia, costa supra conspicua subtus prominente, nervis lateralibus utrinque 10 supra conspicuis subtus prominentibus saltem supremis intra marginem arcuatim iunctis, nervulis rete laxum subtus prominulum efficientibus, margine parum revoluta, scabrida, petiolo 1·5–2·5 cm. longo scabridulo suffulta ; stipulae persistentes, 1·5 cm. longae, dorso scabridulae. *Capitula* et axillaria et terminalia, breviter pedunculata. *Receptacula* inter se connata. *Calyx* brevis, extra scabridulus. *Corolla* alba, ante anthesin punicea (ex *Kerr*), extra puberula ; tubus 1·8 cm. longus ; lobi 5, elliptico-lanceolati,

apice subacuti, 8 mm. longi, 4 mm. lati. *Stamina* 5, ad corollae tubi medium posita. *Stylus* filiformis.

Kanburi, Baw Noi, 700 m., open grassy forest, *Kerr* 10,260.

**Gynochthodes puberula** *Craib* [Rubiaceae-Morindeae]; a *G. macrophylla* Kurz, cui habitu similis, pedunculis et pedicellis longioribus, pedicellis et receptaculis puberulis recedens.

*Ramuli* recti, puberuli, sicci primo fusci, mox pallide plumbei vel plumbei, ad 6 mm. diametro. *Folia* oblongo-elliptica, elliptica, vel rarius oblongo-lanceolata, apice subobtusa, saepissime breviter acuminata, basi cuneata vel late cuneata, 7–12 cm. longa, 2·7–5 cm. lata, rigide chartacea, vel subcoriacea, sicca fusca, subtus in nervorum axillis glandulosa et saepissime breviter sparse hirsuta, aliter glabra, costa supra impressa subtus prominente, nervis lateralibus utrinque 10 supra conspicuis interdum leviter impressis subtus prominentibus, nervulis pagina utraque subconspicuis, margine recurva, petiolo 7–10 mm. longo supra canaliculato suffulta; stipulae parvae, late deltoideae, dorso puberulae. *Inflorescentia* axillaris, petiolo fere dimidio brevior, pedunculo communi ad 3 mm. longo, pedicellis ad 4 mm. longis puberulis. *Receptaculum* puberulum, circa 1·25 mm. longum. *Calyx* brevis, truncatus. *Corolla* extra glabra, tubo 0·5 mm. longo, lobis 4 oblongo-linearibus 6 mm. longis 1·5 mm. latis intra villosis. *Antherae* 2 mm. longae. *Styli* fere e basi liberi, 1 mm. longi.

Kaw Pangan, *Put* 809.

**Prismatomeris filamentosa** *Craib* [Rubiaceae-Morindeae]; a *P. malayana* Ridl. eiusque affinioribus filamentis quam antheris conspicue longioribus recedens.

*Ramuli* iuventute conspicue 4-angulati, glabri, stramineo-corticati, mox teretes, cortice cinereo vel cinereo-brunneo obtecti, lenticellis haud conspicuis. *Folia* oblonga vel elliptica, apice breviter acute acuminata, basi cuneata, late cuneata, vel rotundato-cuneata, interdum acuminata, saepe parum inaequilateralia, 4–7 cm. longa, 1·5–3 cm. lata, coriacea, sicca plus minusve lutescentia, pagina utraque glabra, costa supra prominula subtus prominente, nervis lateralibus utrinque 7–8 supra prominulis subtus conspicuis nervulis rete laxum pagina utraque subconspicuum formantibus, margine recurva, petiolo circa 5 mm. longo supra canaliculato suffulta; stipulae deciduae. *Flores* per 2–5 ad ramulorum apices umbellatim dispositi, pedunculo communi haud evoluto vel rarius ad 3 mm. longo; pedicelli 3–7 mm. longi, glabri. *Receptaculum* glabrum, circa 1·25 mm. longum. *Calycis* tubus receptaculo subaequilongus, apice truncatus vel parvi-denticulatus. *Corollae* tubus 1·7 cm. longus, lobi circa 10 mm. longi et 3 mm. lati. *Filamenta* 4·5 mm. longa, circa 1 mm. supra corollae tubi basem adfixa, antheris 3·5 mm. longis paululo exsertis.

Rayawng, Ban Pe, *Put* 2720.

**Prismatomeris memecyloides** *Craib* [Rubiaceae-Morindeae] ; a *P. malayana* Ridl. eiusque affinioribus foliis tenuioribus, receptaculo cum calyce breviore recedit.

*Ramuli* graciles, glabri, iuventute 4-angulati, straminei, mox teretes, cortice brunneo-cinereo obtecti, lenticellis haud conspicuis. *Folia* anguste elliptica, oblongo-lanceolata, vel late lanceolata, apice obtuse acuminata, basi saepe parum inaequilateralia, cuneata vel late cuneata, 5–11 cm. longa, 2–4 cm. lata, rigide chartacea, supra saepissime plus minusve fuscescentia, subtus pallide viridia, pagina utraque glabra, costa supra prominula subtus prominente, nervis lateralibus utrinque 6–8 supra plus minusve conspicuis subtus prominulis intra marginem anastomosantibus, nervulis tantum paucis subconspicuis, petiolo circa 5 mm. longo supra canaliculato suffulta ; stipulae deciduae. *Flores* albi (ex *Rabil*), ad apices ramulorum solitarii vel per 3–5, pedunculo communi haud evoluto, pedicellis 4 mm. longis glabris. *Receptaculum* glabrum, sicco fuscum, 1 mm. longum. *Calycis* tubus 0·75 mm. longus, subtruncatus. *Corollae* tubus 1·6 cm. longus, utrinque glaber, lobi 7–8 mm. longi, 1·5–2 mm. lati, glabri. *Stamina* 4, filamentis 1 mm. longis glabris supra corollae tubi medium adfixis, antheris inclusis fere 4 mm. longis. *Stylus* cum stigmatibus 18 mm. longus.

Kaw Chang, Salak Kawk, along path, *Rabil* 37.

**Prismatomeris mollis** *Craib* [Rubiaceae-Morindeae] ; a speciebus aliis foliis subtus molliter pubescentibus recedens.

*Frutex* circa 2·5 m. altus (ex *Kerr*) ; ramuli iuventute sicco fusci, mox conspicue 4-angulati, straminei, glabri, demum teretes, cinerei vel stramineo-cinerei. *Folia* elliptico-oblonga vel oblongo-lanceolata, apice acuminata, obtusa, basi cuneata vel subtruncata, acuminata, haud rarius parum inaequilateralia, 12–20 cm. longa, 4–7·5 cm. lata, chartacea, sicca supra plus minusve fuscescentia, subtus pallide viridia, supra glabra, subtus molliter pubescentia, costa supra prominula subtus prominente, nervis lateralibus utrinque 8–10 rectis supremis subpatulis bene intra marginem anastomosantibus supra conspicuis subtus prominentibus, nervulis rete laxum formantibus, margine parum recurva, petiolo 8–15 mm. longo glabro suffulta ; stipulae ad 4 mm. longae, bilobatae, per annum persistentes. *Flores* e ligno annotino orti, inflorescentiam 2 3-floram sessilem formantes, subsessiles ; alabastra alba (ex *Kerr*), glabra, sicco fusca. *Receptaculum* 2 mm. longum. *Calycis* tubus receptaculo duplo longior, apice minute denticulatus. *Corollae* tubus 8 mm. longus, intra glaber, lobi 5, crassi, circa 1·4 cm. longi et 2 mm. lati, glabri. *Antherae* paululo exsertae, 3 mm. longae, filamentis 2 mm. longis paululo supra corollae tubi medium adfixis. *Stylus* cum stigmatibus duobos 7 mm. longus, glaber.

Krabi, Tambon Kao Panom, 100 m., evergreen forest, *Kerr* 18,825.

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## LVIII.—A NEW SPECIES OF ARBORESCENT SENECIO FROM RUWENZORI (SENECIO ERIONEURON).

A. D. Cotton.

In November, 1931, a large collection of plants from Mt. Ruwenzori was presented to Kew by Messrs. C. W. L. Fishlock and G. L. R. Hancock, of the Department of Agriculture, Uganda. The material had been collected by them the previous August during their expedition up the Bujuku Valley, on the western slopes of Ruwenzori, to the Bujuku Lake and to Mount Stanley. Amongst this material was an exceedingly fine series of arborescent Senecios. It was intended to prepare a special paper on the Ruwenzori species of this group. Since, however, several points with regard to certain specimens are still obscure this has not been possible, and the general systematic account must be deferred until the whole matter can be dealt with in a monograph which it is hoped to publish shortly. One hitherto undescribed species stands out markedly and, as this has been previously collected by Prof. H. Humbert and is likely to be found by other botanists who visit Ruwenzori, it appears advisable to describe it forthwith rather than wait until all the species can be clearly defined.

The description of the new species is as follows :—

**Senecio erioneuron** *Cotton*, sp. nov. ; *S. adnivali* Stapf affinis sed trunco tantum 1–2-ramoso et lamina foliorum petiolo excepto infra omnino glabra differt.

*Arbor* usque 5 m. alta ; truncus simplex vel 1–2-ramosus, foliis marcescentibus dense vestitus. *Folia* tenuia, oblonga usque late elliptica, petiolata, irregulariter praecipue ad basin dentata ; lamina 30–40 cm. longa, 15–20 cm. lata, supra glabra, nervis lateralibus distinctis 1·5–2 cm. distantibus, infra glabra, costa apicem versus excepta densissime arachnoideo-villosa ; petiolus alatus in laminam sensim abiens, margine integro, usque 10 cm. longus et 6 cm. latus. *Inflorescentia* bracteata, paniculata, capitulis dense confertis ; axis ramulique tomento longo lanuginoso densissime vestiti ; bracteae foliaceae, anguste oblongae, acutae, integrae, glabrescentes, costa infra valde lanuginosa. *Capitula* late campanulata, usque 3 cm. lata, 1·5 cm. longa, pedunculata. *Involucri bracteae* 3-seriatae ; exteriores lineares, 15–16 mm. longae, 1 mm. latae, interiores 2-seriatae, oblongo-lanceolatae, acutae, 15–18 mm. longae, 3–5 mm. latae, glabrae. *Flores radii* pauci, breviter ligulati, flavi, corollae tubo 7–8 mm. longo, ligula lineari-oblonga 5–8 mm. longa apice 2–3-fida. *Flores disci* circiter 95–105 (–120), 10–12 mm. longi, tubo inferne cylindrico superne leviter dilatato. *Achaenia matura* 5 mm. longa, 1 mm. lata, valde striata, glabra. *Pappi setae* barbatae, circiter 1 cm. longae.

Ruwenzori. Massif versant Ouest, Juillet, 1929, 3600 m. *H. Humbert* 8929 (type). Bujuku Valley, Aug. 1931, 11,500 ft.,

PLATE VIII.

*Senecia erioneuron* Cotton, sp. nov. In Bujuku Valley, Ruwenzori, alt. about 13,000 ft. Photo: G. L. R. Hancock.

[*To face page* 438.

*Fishlock & Hancock* 70, 117 ; 12,500 ft., 81, 82, 83, 99 ; 12,000 ft., 116. (? Mt. Stanley, Aug. 1931, 14,000 ft., *Fishlock & Hancock* 98.)

The tree Senecios on the enormous massive of Ruwenzori are much more difficult to differentiate than those inhabiting other African summits or mountain ranges. Of the seven or eight species which have been recorded from this mountain, the following only are sharply defined and have been collected on several occasions.

(1) *S. longiligulatus* de Wildeman, forming the lowermost zone at about 10,000 ft., a species with thin, glabrous leaves and long ray florets.

(2) *S. adnivalis* Stapf, forming a much higher zone, probably extending from 12,000 to 14,000 feet, a repeatedly branched species characterized by very short ray florets and thick leaves with persistent arachnoid tomentum on the under surface.

(3) *S. Friesiorum* Mildbraed, apparently confined to the highest altitudes (about 14,000 ft.) and clearly distinguished from all other species on the mountain by the homogamous flower-heads and very dense, short, white tomentum on the under side of the leaf.

The new species here described occurs above the *S. longiligulatus* zone and continues into that of *S. adnivalis*, and the plant itself is in some respects intermediate in character between these two species. The fact, however, that Messrs. Fishlock and Hancock found it in plenty from 11,000 to 12,500 feet and that they differentiated it by field-characters confirms the decision, based on morphological features in the herbarium, that the plant is a distinct species. The latter characters consist in the ray florets being of medium length and in the under-surface of the leaf-blade being glabrous though traversed by a midrib clothed with a white villous tomentum. The glabrous leaf, it may be remarked, separates it also from the various new species recently described from Ruwenzori by Dr. de Wildeman which are not yet well understood and which are consequently not referred to above. The field characters which distinguish *S. erioneuron* from *S. adnivalis* are, according to Messrs. Fishlock and Hancock, its shorter stature, much less branched habit and more persistent leaves (*see* plate VIII). It moreover prefers boggy ground, whereas *S. adnivalis* occurs chiefly on drier moraines.

The first undoubted material of this species to reach Kew was a fine specimen collected by Prof. H. Humbert during his expedition to equatorial Africa in 1929 and presented to the Herbarium. Several rather fragmentary specimens, which occur in various herbaria, are also possibly referable to *S. erioneuron*, but these are not fully localized and, being questionable, are not cited. One doubtful specimen is, however, included, namely that collected on Mount Stanley, from which few, if any, plants exist in herbaria. This (No. 98) was from a rather small-leaved tree and was specially collected by Mr. Fishlock. The leaf appears to be typical *S. erioneuron*, though this species was not noted elsewhere as occurring at so high an altitude as 14,000 feet.

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## LIX.—PRELIMINARY INVESTIGATIONS IN GRAFTING COFFEE AT AMANI, EAST AFRICA. K. E. Toms.

Grafting in the Open.

The first attempts were made in August, 1931, by grafting selected *Coffea robusta* on to stocks of the same species. The stocks were suckers from old trees grown under the shade of *Grevillea robusta* in the plantation. These trees were in a healthy and flourishing state before being cut back the previous January, for other purposes, to within 9 inches of the ground. One to three suckers were allowed to develop on each stump.

Several slight modifications of the ordinary veneer method of grafting were employed, with varying conditions of both stocks and scions. A 60 per cent. " take " was obtained, and at the time of writing the healthy shoots measure 3 to 4 ft. above the union, which can only be detected on close examination.

The success of grafting *C. robusta* on itself justified further attempts, using *C. arabica* as the scion. In November, during the rainy season, trials were made with the stocks described above, and scions from strong young shoots of *C. arabica* cut in an old plantation nearby. Shoots to the number of 59 were grafted on 29 plants. The " takes " at present, with shoots 2 to 4 ft. long and large healthy leaves, number 18 on 13 plants. This result may not appear particularly successful, but it should be remembered that the trial was purely experimental and not an attempt to achieve the largest possible number of " takes."

In all cases the grafts were tied with raffia and the point of union covered with grafting wax. Twenty-one grafts were given the added protection of inverted test tubes of one inch diameter. This method is an expensive and cumbersome one and as nearly all the grafts failed it was considered that further trials were unnecessary. An inexpensive method of protection reported to be used with success in Java is now being tested. Paper tubes are made about 1 inch diameter and 8–10 inches long, tied with twine at one end and dipped in melted paraffin wax. These are slipped over the graft and tied again at the bottom ; no grafting wax is used.

Another experiment, also started in November during the rains, may not appear very successful, but is indicative of the best type of scion and therefore has value. The stocks were healthy plants about 8 years old supposed to be the progeny of a hybrid, *C. robusta* x *C. arabica*, but in appearance typical of *C. robusta*. Thirty-six plants were cut back to within 1 foot of the ground, the stems at that height varying in diameter from $1\frac{1}{2}$ to $2\frac{1}{2}$ inches. The bark ran very freely, rind grafting being the method used : 1 to 3 scions were inserted into each stump.

The stocks were divided into 3 groups of 12 plants and each group was grafted with a different type of scion as follows :

A, Scions of terminal shoots about 6 inches long.

B, Scions of firm green wood. (1 node.)

C, Scions of mature brown wood. (1 node.)

The three types of scions were cut from the same long shoots.

| Type. | Number of Stocks. | Number of Scions. | Number of "takes." |
|---|---|---|---|
| A | 12 | 28 | 2 |
| B | 12 | 31 | 9 |
| C | 12 | 28 | 4 |

The type of scion used in Group B has also proved superior in all other trials where it has been used. The difference between Groups A and C is not significant, all other experience having shown that terminal shoots are superior to the mature brown wood.

Other grafting with the ordinary graft method was done during the hot dry weather of February. The stocks were the suckers of Robusta coffee and the scions were from four-year-old plants of Mocha coffee raised from imported seed. Fifty per cent. of the grafts are now making healthy shoots. This may be regarded as a satisfactory "take" as the plants from which the scions were taken were not in normal, vigorous growth.

During the same month, strong shoots from a healthy plant of *Coffee arabica* were grafted on to 8 eighteen-month old plants of *C. excelsa* in the seed bed. Seven are now growing rapidly and have been moved to permanent positions.

In the case of the stocks, the best union is effected on the firm green wood and it seems an advantage to make the cut where the wood is slightly older than that of the scion.

Grafting under Cover.

While the above trials were in progress, another of a different nature was carried out with seedling grafts under glass in a propagating house. Seeds of *C. arabica*, *C. liberica*, *C. robusta* and *C. Quillou* were sown in August in about 4 inches of river sand on a bench. They germinated very unevenly but a few had fully developed cotyledons by November.

The *C. arabica* seedlings which were used as a scion were cut off just above the level of the sand. With a sharp razor blade two nearly parallel slices were cut down the stem making a long tapering wedge beneath the plumule and cotyledons.

A vertical cut was made in the stock, starting at the plumule and going towards the ground, so that the two cotyledons fell apart. The point of the wedge of the scion was inserted at the bottom of the slit, the two halves of the stock brought together and the whole bound with a thin strand of raffia. The finished graft had the appearance of a seedling with two pairs of cotyledons one above the other.

Each graft was covered with an inverted test tube for about 4 weeks.

More grafting was done in February when the seedlings were stiff and wiry and much easier to handle, but they seemed to take much longer to recover from the check in growth. It is quite possible that this check was caused by lack of food supplies, and it is

suggested that it would have been better if the seedlings had been raised in a good compost, to encourage a strong and continuous growth.

With a view to discovering the limit of conditions for grafting seedlings, 5 seedling Robusta and 4 Liberica were used as stocks in the seed beds outside in the nursery. For 2 days no protection was given other than that ordinarily provided for seed beds. This was found to be inadequate and protection from the drying winds was added. In spite of somewhat harsh treatment 2 of each kind survived and are now in a flourishing condition.

This method of seedling grafting is a promising one for raising plants of one species on the root system of another, and is worthy of further investigation. The nursery requirements for raising plants on a large scale would not be elaborate or expensive. Grafting would not be subject to weather conditions, a hundred per cent. success would be attained, and practice would soon make the operation a speedy one. In addition the graft would be strong, minimising the danger of mature plants being snapped off at the point of union by storms.

## Conclusion.

To find the species or variety of *Coffea* making the best stock will, of course, need much further research and will probably vary with the locality. Grafting can be done at Amani at almost any time of the year, but the best time is during the dry season. The preliminary work recorded above gave no opportunity of determining which of the dry seasons is most favourable, but probably the cool dry season would give the best results.

According to reports from Java, grafting is being used fairly extensively for raising new stock and for improving established plantations.

So far the data collected here is in general agreement with that reported from Java.

Coffee is not a difficult plant to graft and if grafting is proved to be a more profitable method of cultivation, there is no doubt that propagation by this means could easily be developed on a large scale in East Africa.

This article may seem somewhat premature, but as circumstances prevent the writer from undertaking further work on this subject, it is considered desirable that an account of the work done, and the conclusions reached, should be placed on record. The future behaviour of the grafted plant may prove these conclusions to be wrong. They have, however, a potential value in indicating the direction of future investigations.

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## LX.—NOTES ON THE FLORA OF SOUTHERN AFRICA: II.* New or Noteworthy Plants. R. A. Dyer.

### Geraniaceae.

**Sarcocaulon Vanderietiae** *L. Bolus*[1].—In connection with the revision of the flora of the Albany and Bathurst Divisions, the genus *Sarcocaulon* has been critically examined, especially the status and range of *S. Patersonii* Harv. This species, according to Harvey[2], occurs in various localities from the Orange River, the type locality, through the Karroo to Albany Division. The result of this study revealed the fact that more than one species was included by Harvey under *S. Patersonii*, and that this species is restricted to the western Karroo region. Recently Mrs. Bolus has also made a study of the genus and has described a new species, *S. Vanderietiae*, from the Albany Division, grown by Mrs. van de Riet, of Grahamstown. This species corresponds with certain material quoted by Harvey, l.c., and to *S. Vanderietiae* should be added the following synonymy: *S. Patersonii* Harv. in Harv. and Sond. Fl. Cap. i. 256 (1860), partim; Kunth in Engl. Pflanzenr. Geraniaceae, 313 (1912), partim; *S. L'Heritieri* Eckl. et Zeyh. Enum. no. 436, 57 (1836), non DC.; *S. Burmanni* Hook. in Bot. Mag. t. 5729 (1868) ?, non DC.

In the wild state *S. Vanderietiae* is a small plant, 12–20 cm. high, with somewhat horizontally spreading branches; the branches are seldom fully turgid, owing to the prevailing dry conditions, and are closely set with spinescent petioles. The bases of these modified petioles are swollen when young and almost as broad as the stem, but shrink and flatten with age.

It may be seen from the synonymy that this plant has been referred to three different species, all of which inhabit the western areas of the Karroo and Namaqualand. The earliest collection of *S. Vanderietiae* was made by Ecklon about 1830 in the Fish River valley, Albany Division, and was referred by Eckl. and Zeyh., l.c., to

*Continued from *K.B.* 1932, 155.
[1] South Afr. Gard. & Country Life, xxii. 110 (1932).
[2] Harv. & Sond. Fl. Cap. i. 256 (1860).

*S. L'Heritieri* (DC.) Sweet, from which it is readily distinguished by its smaller flowers and very much shorter awns on the calyx-segments. The fact that the plant figured in the Botanical Magazine, t. 5729 (1868), came from the Botanical Gardens, Grahamstown, Albany Division, suggests that it originated from the Fish River valley, and represents a cultivated form of *S. Vanderietiae*, but the spine-bases are not shown as swollen and the apical leaf margin is minutely serrate. Kunth, l.c., cites this fig. in the synonymy of *S. Burmanni* (DC.) Sweet. *S. Patersonii* (DC.) Eckl. et Zeyh., to which species both Harvey, l.c., and Kunth, l.c., referred the eastern Cape plants, is based on fig. 14 in Paterson's Travels in Africa. The stem is very thick and fleshy, with truncate branches sparsely covered with spines and leaves, and is quite unlike the Albany species.

The following specimens in the Kew Herbarium are considered to represent the wild state of *S. Vanderietiae* and indicate its distribution :—Albany Div. : Fish River valley, Oct., *Ecklon and Zeyher* Enum. 436 ; Dec., *Schlechter* 6114 ; April, *Dyer* 909 ; *Bowker*, without no. Uitenhage Div. : *Alexander Prior*, without no. Graaff Reinet Div. : March, *Bolus in Herb. MacOwan* 39 ; Middelburg Div. : Sneeuwberg Mt. between Compas Berg and Rhenoster, *Drege* 7515a ; Cradock Div. : *Cooper* 491 ; Somerset East Div. : *Atherstone* 21 ; 206 ; *Bowker*, without no.

**Sarcocaulon spinosum** (*Burm. f.*) *O. Kuntze*.—Kunth, l.c., although quoting in the synonymy of *S. Burmanni* (DC.) Sweet, the names *Geranium spinosum* Burm. f.[3] and *Monsonia Burmannii* DC.[4], retains the latter specific epithet. This is incorrect according to the International Rules since *spinosum* has priority.

**Pelargonium ovale** *L'Hérit.* Geran. t. 28 (1788).—Harvey[5] quoted this plate as a variety of *P. ovale* Harv. (*Geranium ovale* Burm. f.). Knuth[6] followed Harvey's classification and ignored the fact that L'Héritier and not Harvey was the first to use the name *P. ovale*. The plate of *P. ovale* L'Hérit. is excellent in character and detail, and with the accompanying dissections, validates the publication of the name. If then, *P. ovale* Harv. is a distinct species, it is also a later homonym of *P. ovale* L'Hérit., and according to the International Rules, would require a new name. Harvey, after examining a wealth of material and considering the figures and descriptions, stated that he found it impossible to recognise more than one species. His view was accepted by Knuth, l.c., who not only retained the four varieties established by Harvey, but in addition recognised two forms of the variety *Dregei*.

As constituted at the present time, the species *P. ovale* Harv. is too heteromorphous for convenience, and it is considered more

[3] Burm. f. Spec. Geran. 16 (1759).
[4] DC. Prod. i. 638 (1824).
[5] Harv. & Sond. Fl. Cap. i. 291 (1860).
[6] Knuth in Engl. Pflanzenr. Geraniaceae, 416 (1912).

practical to resuscitate some of the species of earlier author which are found in synonymy.

To facilitate the study of the flora of Albany and Bathurst, and until such time as a more comprehensive investigation of this group of plants is possible, it is here only necessary to deal decisively with those found east of Van Staadens River, in the Port Elizabeth, Uitenhage and Bathurst Divisions. All the plants in this area, formerly referred to *P. ovale* (Burm. f.) Harv. var. *ovatum* Harv., agree very closely with *P. ovale* L'Hérit., the type of Harvey's variety *ovatum*. As stated, *P. ovale* L'Hérit. has priority over Harvey's combinations and L'Héritier's name is therefore retained for the eastern Cape plants. They differ from the western Cape forms in having a larger and comparatively regular purple corolla; calyx 15–20 mm. long; stipules lanceolate, about 15 mm. long, shortly pubescent, or the margin glabrescent. The plants are branched from a woody base, and the inflorescences are usually over 30 cm. high; the stems and leaves are covered with a long greyish indumentum.

For the time being, however, in addition to the above change in nomenclature, the Kew Herbarium material of *P. ovale* Harv. has been subdivided provisionally by the recognition of **P. eriostemon** *Jacq.*[7] [=*P. ovale* (Burm. f.) Harv.] **P. blattarium** *Jacq*[8] [=*P. ovale* var. *blattarium* Harv.], and **P. veronicifolium** (*Eckl. et Zeyh.*) *Steud.*[9] [=*P. ovale* var. *veronicifolium* Harv.]. The residue, including *P. ovale* var. *Dregei* Harv., should probably be divided into two species. *Geranium ovatum* Cav.[10] is possibly indistinguishable specifically from one or other of the first two, but his figure has not been matched exactly with herbarium specimens at Kew. Further material of all forms with full field notes is required before a satisfactory revision can be written.

**Pelargonium aridum** *R. A. Dyer*, nom. nov.—*P. dissectum* (Eckl. & Zeyh.) Harv., l.c., non Sweet[11]. Sweet applied the name *P. dissectum* to a garden hybrid, nevertheless, it invalidates the later homonym.

**Pelargonium (Peristera) parvirostre** *R. A. Dyer*, sp. nov.; affine *P. grossularioidi* (Linn.) Ait. sed foliis omnibus tripartitis, segmentitis profunde pinnatifido-incisis, floribus minoribus, fructus rostro multo breviore differt.

*Herba* annua diffusa. *Caules* 30–50 cm. longa, 1·5–2 mm. diametro, angulosi, tenuiter et breviter pubescentes, rubri, internodiis usque 6 cm. longis. *Folia* tripartita, segmentis profunde pinnatifido-incisis, lobulis inciso-crenatis, usque 1·5 cm. longa, 2 cm. lata, cordata, utrinque glabra, margine pagina superiore

[7] Jacq. Hort. Schoenb. ii. 4, t. 132 (1797).
[8] Jacq. l.c. ii. 3, t. 131 (1797).
[9] Steud. Nom. ed. 2, ii. 291 (1841).
[10] Cav. Diss. iv. 238, t. 103, f. 3 (1787).
[11] Sweet Geran. iii. t. 247 (1825).

leviter incrassato ; petioli breviter pubescentes vel glabrescentes, foliorum basalium usque 6 cm. longi, superiorum breviores ; stipulae amplexicaules, semiorbiculares vel late ovatae, obtusae. *Pedunculi* 1–3·5 cm. longi, 3–8-flori ; bracteae plerumque 6, ovatae vel lanceolatae, acutae. *Flores* pedicellati, pedicellis gracilibus, breviter glandulosis, usque 4 mm. longis calycis calcari excluso. *Calycis* calcar pedicello multo latius, sepala versus sensim ampliatum, glandulosum, 2–2·5 mm. longum ; sepala ovata vel lanceolata, 3 mm. longa, extra glandulosa et pilis paucis brevibus instructa. *Petala* 3 mm. longa, dilute rosea, 2 superiora ligulata, 3 inferiora spathulata. *Stamina* fertilia 5, antesepala, sepalis breviora ; staminodia 5, antepetala, brevissima. *Ovarium* dense villosum. *Fructus* rostro excluso subglobosus, 2·5–3 mm. longus, 3 mm. diametro ; rostrum 2·5–3·5 mm. longum, breviter puberulum ; semina oblongo-obovata, plana, glabra.

Eastern Cape Province : Albany Division ; near Grahamstown, Sept., *Schonland* 370 (type). Bathurst Division ; near Port Alfred, Sept., *Burchell* 3792 ; Trappes Valley, Dec., *Daly* 688. Port Elizabeth Division ; Port Elizabeth, waste places, *Holland*.

This species is apparently endemic in the Eastern Cape Province and for some time has been considered a form of *P. grossularioides* (Linn.) Ait., but is distinguished from that in all the leaves being tripartite, the smaller flowers, and the broad fruit with very short rostrum.

**Pelargonium (Ciconium) frutetorum** *R. A. Dyer*, sp. nov. ; affine *P. inquinanti* Linn. et *P. zonali* Linn. ab illo foliis zonatis, petalis salmoneis nec cruento-rubris, ab hoc petalis latioribus, florum colore, sepalis oblongo-linearibus apice rotundatis vel breviter apiculatis, foliis mollius pubescentibus lobis crenatis differt.

*Planta* suffrutescens, sparse ramosa, ramis plus minusve scandentibus, usque 1·25 m. alta. *Caules* teretes, 5–7 mm. crassi, carnosulo-sublignosi, pubescentes. *Folia* orbiculata vel reniformi-orbiculata, basi cordata, 5-lobata, lobis crenatis vel crenato-dentatis, usque 5 cm. longa, 4–7·5 cm. lata, vix carnosula, zonata, utrinque indumento molli satis induta ; stipulae latae vel latissime ovatae, 11–18 mm. longae, 9–13 mm. latae, abrupte acuminatae, mox membranaceae. *Pedunculi* 8–20 cm. longi, pubescentes, pilis glandulosis longis instructi, usque 12-flori ; bracteae plerumque 6, stipulis similes sed multo minores. *Flores* pedicellati, pedicellis 3·5–5·5 cm. longis, calycis calcare tenui 3·3–4·7 cm. longo eis adnato, pilis brevibus glandulosis et perpaucis longioribus eglandulosis ornatis. *Sepala* oblongo-linearia, 6–8 mm. longa, circiter 1·5 mm. lata, apice obtusa vel breviter apiculata, extra pilosa. *Petala* subaequalia, obovata vel obovato-cuneata, apice rotundata, 3 inferiora usque 20 mm. longa, 10 mm. lata, extra rosea dilutissima, intus salmoneo-rosea, 2 superiora saturatius colorata. *Stamina* fertilia 7,5 antesepala calyci fere aequilonga,

2 posteriora, antepetala, breviora. *Ovarium* dense villosum. *Fructus* fere 3 cm. longus, rostro pilis patulis albidis hirsuto.

Eastern Cape Province: Bathurst Division; in the coastal bush between the Kasouga and Kowie Rivers, Oct., *Burchell* 4029, 4090 (type); *Britten* 689. Alexandria Division; in bush at Bushmans River mouth, occasional, May, *Galpin* 10,664.

This species assumes a scrambling habit in its native habitat, but in cultivation at Kew it shows a more compact growth and an intensification of the zonal leaf-marking. A cultivated plant is being figured in the forthcoming part of Hooker's Icones Plantarum.

**Pelargonium (Ciconium) salmoneum** *R. A. Dyer*, sp. nov.; affine *P. zonali* Linn. sed foliis haud zonatis magis carnosulis saepe subglaucis, petalis maioribus truncato-obtusis roseo-salmoneis, 2 superioribus rubrinerviis, staminibus fertilibus tantum 5 differt.

*Planta* suffrutescens, sparse ramosa, ramis plus minusve erectis, florifera usque 80 cm. alta. *Caules* teretes, 4–5 mm. crassi, carnosulo-sublignosi, breviter pubescentes. *Folia* semi-orbiculata vel reniformia, basi magis minusve cordata, obscure 5-lobata, lobis grosse crenatis, crenis saepe crenulatis et interdum apiculatis, usque 4·5 cm. longa, 5 cm. lata, carnosula, haud zonata, utrinque minutissime glanduloso-scaberula et praeterea pilis longioribus eglandulosis sparsis apicem versus porrectis munita, undique viridia vel subglauca; stipulae lanceolatae vel late ovatae, 5–13 mm. longae, 4–7 mm. latae, mox membranaceae. *Pedunculi* 5–14 cm. longi, tenuiter et breviter pubescentes, 4–14 flori; bracteae plerumque 6, stipulis similes sed minores, mox deciduae. *Flores* pedicellati, pedicellis 2·8–3 cm. longis, calycis calcari usque 2·5 cm. longo eis adnato, pilis brevibus glandulosis ornatis. *Sepala* lanceolata vel oblongo-lanceolata, acuta, 10–12 mm. longa. *Petala* subaequalia, 2 superiora leviter angustiora, obovato-cuneata, subtruncata, 2·3–2·5 cm. longa, 1–1·4 cm. lata, roseo-salmonea. *Stamina* fertilia 5, antesepala, sepalis subaequilonga; staminodia antepetala, multo breviora. *Ovarium* dense villosum. *Fructus* 4–4·5 cm. longus, rostro pilis patulis albidis hirsuto.

Eastern Cape Province. Origin unknown. During the Director's official tour in the Union of South Africa, 1930–31, he noticed this species growing in Port Elizabeth on the municipal rockeries under the charge of Mr. F. R. Long. Up to the present time no definite information is available as to its wild habitat; however, owing to its large, beautiful, salmon-pink flowers, it is a very desirable species for cultivation. The plant described was brought to Kew in 1931 by Miss Hill, and a specimen has been preserved in the Herbarium under number P. 104.

## Araliaceae.

**Seemannaralia** *Viguier* in Ann. Sci. Nat. ser. 9, iv. 116 (1906), descr. ampl.; affine *Cussoniae* Thunb. et *Panace* Linn., ab illa foliis simplicibus, seminibus haud ruminatis, ab hoc pedicello cum ovario

continuo, ab ambobus fructu lateraliter multo compresso membranaceo, petalis leviter imbricatis differt.

*Calyx* brevissime 5-dentatus. *Petala* 5, leviter imbricata. *Ovarium* 2-loculare, compressum ; styli 2, divaricati, persistentes. *Fructus* lateraliter compressus, obovatus, membranaceous, longitudinaliter costatus. *Arbuscula* vel *arbor* usque 18 m. alta. *Folia* palmatifida, basi cordata, lobis deltoideis acuminatis inaequaliter glanduloso-dentatis vel serratis, 5-nervia. *Flores* umbellati, umbellis pedunculatis racemosis vel racemosim paniculatis, pedicello cum ovario continuo.

Species 1, endemic in forests of eastern South Africa.

**Seemannaralia Gerrardii** (*Seem.*) *Viguier*, l.c. 118.

*Arbuscula* vel *arbor* usque 18 m. alta, 20–40 cm. diametro, cortice cinereo. *Folia* 7–15 cm. longa et lata, palmatifida, basi cordata, 5-lobata, lobis deltoideis acutis vel acuminatis inaequaliter glanduloso-dentatis vel serratis, palmatim 5-nervata, subtus in axillis nervorum ad basin laminae plerumque barbato-tomentella, petiolo 6–12 cm. longo. *Racemi* axillares vel terminales, bracteis deltoideis, umbellis multifloris, bracteolis minutis, pedicello leviter 1 cm. longo cum ovario continuo. *Calyx* brevissime 5-dentatus, dentibus late deltoideo-ovatis. *Petala* 5, ovata, leviter imbricata, 2 mm. longa. *Ovarium* 2-loculare, compressum, costatum, glabrum ; styli 2, divaricati, demum recurvi, persistentes. *Fructus* lateraliter compressus, late obovato-oblongus, membranaceus, 9–10 mm. longus, 7–8 mm. latus, longitudinaliter plerumque 5-costatus ; semen 1, planum compressum.—*Cussonia Gerrardii* Seem. Journ. Bot. iv. 298 (1866) ; Benth. & Hook. f. Gen. Pl. i. 945 (1867) ; Seem. Rev. Hederaceae 74 (1868) ; Oliv. in Hook. Ic. Plant. t. 1454 (1884) ; Harms in Engl. & Prantl. Nat. Pflanzenf. iii. Abt. 8, 54 (1898) ; Wood, Revised List Fl. Natal, 162 (1908). Burtt Davy in Kew Bull. 1908, 149 ; Thonner, Die Blutenpfl. Afr. Nachtr. u. Verbesser. 61 (1913) ; Fl. Plts. S. Afr. (1915) ; Engl. Pflanzenwelt Afr. 784 (1921) ; Burtt Davy, Fl. Pl. Transvaal, ii. 514 (1932). *Panax Gerrardi* Harv. Gen. S. Afr. Pl. ed. 2, 147 (1868) ; Wood, Hand-book Fl. Natal, 57 (1907) ; Revised List, 162 (1908) ; Sim, Fl. Trees & Shrubs in S. Afr. 180 (1919) ; Native Trees of S. Afr. 95 (1921) ; Bews, Fl. Natal & Zul. 150 (1921) ; Marloth, Fl. S. Afr. ii. pt. 2. 234 (1925) ; Phillips Gen. S. Afr. Fl. Pl. 444 (1926).

Pondoland : Port St. Johns, *Boshoff in Herb. S. Afr. Forestry* 5289 ; Flagstaff, Isililo forest, March, *Miller in Herb. S. Af. Forestry* 4080. Natal : Alexandra District, near Dumisa, 2400–3000 ft., April, *Rudatis* 909 ; 997 ; 1660 ; near Durban Ismont, *Gerrard* 1264 ; *Wood* 1879 ; near Pietermaritzburg, June, *Henkel & Bayer*, without no. Zululand : Qudeni forest, *Fernando in Herb. S. Af. Forestry* 1449.

A specimen consisting of a leafy twig collected by *Rehmann* (6785) in the Transvaal (without locality) shows a strong likeness to this species and it would be of interest to obtain complete material.

The systematic position of *Seemannaralia Gerrardii* has been the subject of divergent views almost since it was first collected by Gerrard. In 1866 Seemann, l.c., described it under the name *Cussonia Gerrardii*, and two years later Harvey, l.c., who had evidently not seen Seemann's work, described duplicate material as *Panax Gerrardi*. Later, when Oliver figured it as a *Cussonia* in Hook. Ic. Pl. t. 1454 (1884), he added the following qualification, " I think a very doubtful member of the genus Cussonia." Sim, in his Native Trees of S. Afr. 95 (1921), cites it as a *Panax* but adds, " Panax is now divided up, and this is no longer a Panax, nor is it a Cussonia, so its generic place is not clear."

Recent authors have apparently overlooked the work of R. Viguier on the classification of the Araliaceae, which was mainly concerned with the anatomy of the family. In the Ann. Sci. Nat. (1906) he established several new genera, amongst them, *Seemannaralia*, founded on *Cussonia Gerrardii* Seem. This was reduced again to *Cussonia* by Thonner, Die Blutenpfl. Afr. Nachtr. u. Verbesser 61 (1913). An independent study of more complete material has confirmed Viguier's view and an amplified description is given above with full synonymy.

### Ericaceae.

**Erica (Elytrostegia) orientalis** *R. A. Dyer*, sp. nov. ; affinis *E. glumiflorae* Klotzsch sed corolla suburceolata quam calyce longiore, sepalis obovatis scariosis et inflorescentia laxiore differt.

*Caules* 20–60 cm. alti, ramis et ramulis pubescentibus, ramulis lateralibus 1-1·5 cm. longis. *Folia* ternatim verticillata, 6–7 mm. longa, linearia, erecta, supra plana, subtus sulcata, glabra vel juniora minute ciliata, petiolis brevibus. *Flores* ad apices ramorum brevium 3-nati. *Pedicelli* 2–3 mm. longi, pubescentes, bracteis obovatis calyci similibus sed brevioribus imbricatis. *Calyx* 3 mm. longus, segmentis obovatis carinatis ciliatis scariosis. *Corolla* 4–5 mm. longa, suburceolata, lobis brevibus non recurvis. *Antherae* exsertae, caudis instructae. *Ovarium* glabrum ; stylus exsertus ; stigma subpeltatum.

Eastern Cape Province : Bathurst Division ; Trappes Valley, near a vlei, shrublet, flower white, Dec., *Dyer* 2278 (type) ; Kleinmond, July, *White* 51. Albany Division ; Alicedale, Sept., *Cruden* 82. Stutterheim Division ; Fort Cunningham, in very limited area, *Sim* 1895. Note :—the flowers of the last two specimens are smaller than in the type, but are otherwise equal. A specimen in the Kew Herbarium collected by Alexander Prior, without exact locality, seems intermediate between *E. glumiflora* and *E. orientalis*.

### Myrsinaceae-Celastraceae.

**Myrsine Gerrardii** *Harv.*—Harvey, ex C. H. Wright in Dyer, Fl. Cap. iv. pt. 1, 436 (1909), founded this species on somewhat incomplete material, *Gerrard* 1157 in part. A comparison of his type with

*Ecklon and Zeyher* Enum. 972 (1835), the type number of **Cassine eucleiformis** (*Eckl. et Zeyh.*) *O. Kuntze*, in the Kew Herbarium, shows the two plants to be the same species. *Myrsine Gerrardii* Harv., therefore becomes a synonym of *Cassine eucleiformis* (Eckl. et Zeyh.) O. Kuntze.

It is interesting to note that a duplicate of *Gerrard* 1157 is referred to the latter species by Davison in Bothalia, ii. i, 327 (1927). Davison, l.c., cites in synonymy *Celastrus filifolius* Thunb., a specific epithet which dates from Linn. f. Suppl. 153 (1781), based on one of Thunberg's specimens. If the two plants were actually conspecific, the latter name would have priority. However, in Thunb. Fl. Cap. ed. Schultes, 217 (1823), the description includes the phrase "*folia opposita*," whereas *Cassine eucleiformis* has alternate leaves. Sonder, in Harv. & Sond. Fl. Cap. i. 470 (1860), also dissociates the two species.

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## LVI.—ON THE FLORA OF THE NEARER EAST: XIII.*

MISCELLANEOUS NEW RECORDS AND EXTENSIONS OF KNOWN DISTRIBUTIONS. W. B. TURRILL.

**Linum virgultorum** *Boiss. et Heldr.*—a species new to Europe.

This annual species of flax with capitate stigmata and glandular, 3-nerved sepals was described by Boissier and Heldreich in Boiss. Diagn. ser. 1, viii. 105 (1849) from material collected by the latter author "in herbidis inter frutices faucis supra *Tsimbouckkan Pamphyliae* sitae (Heldr. Maio. 1845)." Two sheets of Heldreich's are in the Kew Herbarium.

Mr. L. C. Pinatzi has sent three plants, collected by himself on Mt. Corydalus, Attica, which must be considered as rather small, few-flowered, representatives of *L. virgultorum*. In an accompanying letter he informed the writer that "l'aire de distribution de ce Linum, sur la colline en question est plutôt restreinte, occupé par un terrain calcaire sec couvert de quelques arbrisseaux de Pinus Halepensis. Le sol lui même est courvert d'une couche rare de phrygana, formation habituelle de l'Attique." In addition to providing yet another example of trans-Aegean floristic connection, the discovery of this species, whose known distribution is extremely limited in Asia Minor, on a hill about 5 km. west of Athens indicates how much botanical exploration remains to be done even in relatively well-known areas in the Nearer East.

**Arenaria oxypetala** *S. et S.* and allied species.

In the Florae Gaecae Prodromus i. 303 (1806) Sibthorp and Smith published the species *Arenaria oyxpetala* based on material collected by Sibthorp "in agro Eliensi." The description is to be associated with the figure afterwards published in Flora Graeca, t. 437 (1825). No record has been found of the species having been collected since Sibthorp's time on the mainland of Greece. Mr. L.

*Continued from *K.B.* 1932, 250.

Pinatzi of Athens has, however, forwarded specimens, collected by himself on Mt. Parnes, Attica, in April, 1930, with both flowers and fruits, which certainly belong to this species. Various specimens from other countries of the Eastern Mediterranean Basin have been referred to *A. oxypetala* and an extended investigation has shown that there are a number of morphologically ill-defined species which must be considered in any attempts to trace the geographical distribution of *A. oxypetala.*

Apparently the earliest binomial for any member of the group of species here considered is *Arenaria graveolens* Schreb. in Nov. Act. Nat. Cur. iii. 478 (1767). The habitat is given as " in Oriente," and " Alsine graveolens saxatilis & verna, foliis lanceolatis. Tourn. cor. 17." is cited as a synonym. The description is a fairly complete one but it is difficult to know exactly what value to give to certain of the terms used. By use of the symbol ⊙ Schreber describes the plant as annual, while Boissier, Halácsy, Hayek, and other authors describe it as perennial and even use this as a key character for the separation (*inter alia*) of *A. graveolens* from *A. oxypetala.* Comparing the original description of *A. graveolens* with that of *A. oxypetala* in the Flora Graeca the only differences, apart from slight differences in measurements and relative lengths, are the acute leaves and " calyx " of *A. oxypetala* and the acuminate leaves and " calyx " of *A. graveolens.* Relative, however, to material assigned by later authors to *A. graveolens* the sepals of Sibthorp's type material of *A. oxypetala,* kindly loaned by the Sherardian Professor of Botany, Oxford, are decidedly acuminate as that term is now generally applied. We are thus in a dilemma, since Schreber's description of *A. graveolens* (of which the original material has not been seen) applies better to Sibthorp's material than Sibthorp's own description under the name *A. oxypetala* !

The Cretan material referred to *A. oxypetala* (by Halácsy, Consp. Flor. Graec. i. 232–23 : 1900, and others) and also Sieber's specimen in the Kew Herbarium sub. nom. *Arenaria muralis* (reduced by Halácsy and others to *A. graveolens*) differs from the Greek material of *A. oxypetala* (*Sibthorp, Pinatzi*) in having acute not acuminate sepals. The earliest name for the Cretan plants is *Stellaria muralis* (Link, Enum. i. 429 : 1821), transferred to *Arenaria* as *A. muralis* Sieb. ex Spreng. Syst. ii. 397 (1825). This species, as indicated by Link, is normally an annual.

For the allied perennial species distributed from Asia Minor (and the near-lying islands) to Syria, Palestine, and Sinai the earliest name appears to be *A. pubescens* d'Urv. in Mém. Soc. Linn. Par. i. 306 (1822) from Cos (Coum). A synonym of *A. pubescens* is *A. deflexa* Decne. in Ann. Sci. Nat. sér. 2, iii. 277 (1835), from Sinai, *Bové* 176, 177.

*Arenaria rhodia* Boiss. Diagn. ser. 1, i. 52 (1842) from Rhodes (*Auch.-Eloy* No. 575), described as an annual, is scarcely distinguishable from the Cretan *A. muralis* except by the slightly larger

flowers and fruiting calyces. *A. cypria* Holmboe (Stud. Veg. Cyprus, 68, fig. 16 : 1914) can be best placed under *A. rhodia*.

*Arenaria pamphylica* Boiss. et Heldr. Diagn. ser. 1, viii. 102 (1849) is a relatively well distinguished species on account of the foliaceous bracts. A specimen from Cyprus (ad rupes pr. Kantara, 2.5.1880, *Sintenis et Rigo* 233, in Herb. Kew.) appears to be this species, though the number is quoted by Holmboe, l.c., under *A. oxypetala* S. et S.

Of the varieties included by Boissier under *A. graveolens* (Flor. Or. i. 701 : 1867), *grandiflora* is probably a distinct species, *glabrescens* (*A. sipylea* Boiss.) has not been seen, *graeca* is a distinct species (*A. graeca* Hal.) and *athoa* is also a distinct species which must bear the name *A. filicaulis* Fenzl.

The species closely allied to *A. oxypetala* and here considered can be distinguished as follows :—

Bracts foliaceous, plant annual : *A. pamphylica* (Asia Minor, Cyprus).

Bracts not foliaceous, subulate or shortly triangular

Sepals acuminate.....*A. oxypetala* (Greece).

Sepals acute

Plant perennial.....*A. pubescens* (Asia Minor south to Sinai).

Plant annual

Sepals 3–3·5 mm. long.....*A. muralis* (Crete).

Sepals 4–4·5 mm. long.....*A. rhodia* (Rhodes, Cyprus).

To which, if any, of these microspecies the name *A. graveolens* Schreb. should be applied and whether it would be better to consider them as varieties or subspecies of one species to which the name *A. graveolens* could be applied cannot be decided with the material at present available.

**Cornucopiae cucullatum** *L.* in Greece.

The monotypic genus *Cornucopiae*, with its strange, scarcely grass-like inflorescence, is widely distributed in the extra-European parts of the Nearer East. Specimens at Kew show that its range includes much of Asia Minor from the western sea-board east to Kurdistan, Syria, Palestine, and Iraq. Mr. Pinatzi has sent specimens to Kew, collected by himself in the Athens district, Kallithea, " dans les vergers, rare," April 1932. While this grass may have been recently introduced into Greece it is of interest to note that it is common in the Smyrna district on the opposite Aegean coast and that Sibthorp recorded it from Patmos (see Shaw and Turrill in Kew. Bull. 1926, 122).

**Trifolium leucanthum** *M. Bieb.* Flor Taur. Cauc. ii. 214 (1808).

This species has a rather wide distribution in the Mediterranean Basin, and in the Balkan Peninsula is recorded from Thessaly, N. Macedonia, Thrace, N. and S. Bulgaria, Rodope Massif, Serbia, Hercegovina, and Dalmatia. The var. *declinatum* Boiss. is known from Mt. Oeta Phthiotidis (Sprun.). Material collected by Mr.

Pinatzi on Mt. Parnes, Attica, " pr. loc. Vountima dictum—dans le maquis," in May, 1931, extends the known range of the species southwards in the Balkan Peninsula.

**Scorpiurus muricata** *L.* var. **laevigata** (S. et S. pro sp.) *Boiss.*, known previously from Crete, near Canea, and the Greek Archipelago, has been collected by Mr. Pinatzi " in arvis pr. Gortynam," Crete, 30.4.1932.

**Campanulata spathulata** *S. et S.* var. **Giuseppii** *Milne-Redhead* et *Turrill.*

*Radix* tuberoso-incrassata, inferne dichotoma. *Caulis* tenuis, flaccidus, ramosus, prostratus vel pendulus, circiter quinqueflorus, 20–25 cm. longus, basem versus sparissime hirsutus. *Folia* caulina inferiora elliptica, apice obtusa, inferne in petiolum usque ad 2·5 cm. longum, angustata, margine obscure crenata, lamina usque ad 2 cm. longa et 1·3 cm. lata, pilis paucis dispersis in pagina superiora et in petioli basi instructa ; superiora gradatim angustiora et parviora fere sessilia. *Sepala* patula vel leviter deflexa, linearia, acuta, 8–9 mm. longa, 1 mm. lata, margine fere integra sed cum hydathodis 2–4 instructa. *Corolla* infundibuliformis, 1·6–1·7 cm. longa, lobis patulis vel leviter reflexis 0·9–1 cm. longis, 0·5 cm. latis oblongo-lanceolatis.

The above description has been drawn up from a living specimen grown by Dr. Giuseppi at Trevose, Felixstow, from a plant which he informs us he collected on Mt. Chelmos in Greece. Halácsy (Consp. Flor. Graec. ii. 268–9 : 1902) records the species, as *C. Sibthorpiana* Hal. (= *C. spathulata* S. et S. non. W. et K.), but Giuseppi's plant differs from all the material of the species we have seen in the spreading, or even slightly reflexed, sepals and corolla lobes. The habit is rather that of the var. *filicaulis* (Hal.) than of the type except that the stems are branched and more floriferous. The colour of the corolla-lobes has been matched with " Amparo Purple " (Ridgeway, t. xi.).

**Plants from Sithonia (Longos) Peninsula, Greek Macedonia.**

The Khalkidikē Peninsula, to the south-east of Salonika is divided by two deep bays, on its south-eastern sea-board, into three relatively long and narrow peninsulas, those of Kassandra, Sithonia (more often in western European maps named Longos), and Athos. Of these the last is by far the most famous, and the highest, and has been most visited by botanical collectors. Indeed, Kassandra, except the northern part, and Sithonia are botanically unknown or almost unknown territories. A small collection of plants made by the Hon, H. G. Chick, H.M. Consul-General at Salonika, has, therefore, considerable interest phytogeographically, since it is of sufficient size to indicate that the flora is essentially of a Mediterranean type and rather more characteristically so than the parts of Macedonia to the west and north of Salonika. The specimens were collected early in May of this year mainly near Neos Marmaras, between this

place and Parthenon, around Toroni, and inland from the Koufo Inlet. The first two localities are on the west side of Sithonia, about the middle of the peninsula, and the last two on the west side near the southern end.

The following are represented in the collection: *Anemone hortensis* L. (intermediate between var. *fulgens* Hayek and var. *stellata* Gren. et Godr., near to the former), *Malcolmia flexuosa* S. et S., *Cistus monspeliensis* L., *C. salviifolius* L., *Helianthemum guttatum* (L.) Mill. var. *plantagineum* (Willd.), *H. ovatum* (Viv.) Dun. (probably a stunted form of var. *hirsutum* (Thuill.) sensu Hayek), *Tamarix parviflora* DC., *Silene subconica* Friv., *S. vulgaris* Garcke, *Linum angustifolium* Huds., *Erodium cicutarium* L'Her., *Astragalus macedonicus* Heldr. et Char., *Hymenocarpus circinnatus* (L.) Savi, *Melilotus neapolitanus* Ten., *Vicia dasycarpa* Ten., *Bupleurum junceum* L. (forma *depauperatata*), *Tordylium apulum* L., *Chrysanthemum segetum* L., *Crepis neglecta* L. var. *graeca* Vierh., *Senecio vernalis* W. et K., *Campanula phrygia* Jaub. et Spach., *Arbutus Unedo* L., *Erica arborea* L., *Alkanna tinctoria* (L.) Tausch., *Echium plantagineum* L., *Linaria pelisseriana* Mill., *Lavandula Stoechas* L., *Prasium majus* L., *Euphorbia veneta* Willd., *Muscari comosum* Mill., *Orchis morio* L., *Serapias vomeracea* Briq., *Vulpia bromoides* S. F. Gray.

*Muscari Charrelii* Hal. et Nadji.—I am unable to distinguish *M. Charrelii* as a species distinct from *M. comosum* Mill. The name was first published as a nomen nudum (Halácsy ex Rouy in Bull. Soc. Bot. Fr. xxxviii. 135 : 1891). Later Halácsy and Nadji Effendi (Charrel), in Nadji Effendi, Empire Ottoman Géographie Botanique, 42 (1892), published a short description in French. Neither with the aid of this description nor with that provided by the four sheets at Kew collected by Nadji, can I find any characters to separate the Macedonian plants from *M. comosum* Mill.

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## LXII.—A NEW BERBERIS FROM CHILE AND ARGENTINA.

T. A. Sprague.

The genus *Berberis* is well represented in the South American Andes, especially in Chile and Argentina, 27 species being recognized from these two countries alone in Dr. C. K. Schneider's revision of the genus (Bull. Herb. Boiss. sér. 2, v. 822 : 1905). Perhaps the most remarkable species yet known from South America is *B. Comberi* (Kew Bull. 1927, 175) which, as regards its vegetative characters, is among the least specialized, spine-leaves being completely absent, whereas its *pentamerous* flowers with *superposed* whorls represent a maximum of floral modification. *B. Comberi* was discovered at Cerro Lotena, Argentina, by Mr. H. F. Comber, who saw it also on the road from Zapala to Chos Malal, and between Malala and San Martin, in all three places near to oil drillings and prospectings. Mr. Comber informs us that " one of the peculiarities of *Berberis Comberi* was the way in which the seeds were stuck

together in a round ball, the segments like pieces of an orange," and that the species was raised from seeds, and is still in cultivation at Nymans and Wakehurst, though not growing very well owing to the wet winters. He collected fine herbarium material as well as seeds of various other species of *Berberis* in Argentina. Among these was his no. 415 from Pulmari which was assigned provisionally to *B. montana* C. Gay (*vide* H. F. Comber, Andes Exped. 21 : 1928). Plants of this and of no. 415a were raised in this country, where they have proved to be hardy. Flowering specimens of no. 415a were exhibited at the Chelsea Show of the Royal Horticultural Society in May 1932, and it was then noticed that this number differed in several respects from typical *B. montana*, which had also been raised from seed of no. 798 brought back by Mr. Comber. Specimens were submitted to the writer for identification, and the plant was found to differ sufficiently from *B. montana* to be treated as a separate species. The leaves and flowers are considerably smaller than in *B. montana*, and the stamens are nearly as long as the petals instead of being at most two-thirds of their length as in that species. Perhaps the most important distinction, however, lies in the inflorescence, which is fasciculate or umbellate in *B. montana*, whereas in the new species the flowers are solitary on the short shoots.

Mr. Comber's no. 415a agrees essentially with a specimen in the Kew Herbarium, collected in the Cordillera de Chillan by Ph. Germain in 1856 or 1857 and named " *B. montana* var. *chillanensis* C. K. Schneider " by Dr. Schneider in 1906. This specimen is not, however, the actual type of var. *chillanensis*, which is preserved in the Natural History Museum at Vienna (Bull. Herb. Boiss. sér. 2, v. 395 : 1905), but there is no reason to doubt the correctness of the identification.

The new species, *Berberis chillanensis*, described below, is based : (1) on the above-mentioned specimen at Kew collected by Ph. Germain on the Cordillera de Chillan ; (2) on fresh cultivated material of H. F. Comber's no. 415a, received from Mr. James Comber, Gardener to Lt.-Col. L. C. R. Messel, Nymans, Handcross, Sussex.

**Berberis chillanensis** *Sprague* ex Bean in New Flora & Sylva, v. 50, fig. 16 (1932), anglice, sp. nov. ; affinis *B. montanae* C. Gay, a qua foliis floribusque minoribus, floribus singulis, staminibus petala subaequantibus recedit.

*Frutex* 1–2·5 m. altus. *Rami* subangulati, 3·5–4 mm. diametro 20 cm. infra apicem, cortice cinereo vel cinereo-fusco minute pilosulo longitudinaliter fisso obtecti ; spinae simplices, vel trifidae ramis lateralibus patentibus, 4–8 mm. longae, tenues ; ramuli ascendentes, dense minute pilosuli, cinereo-fusci ; ramulorum spinae simplices, e basi ovato-deltoidea attenuatae, rectae vel apicem versus leviter recurvae, 3–6 mm. longae ; ramuli abbreviati in axillis spinarum singuli vel bini, folia 4–8 (plerumque 5–6) gerentes. *Folia* brevissime petiolata, petiolo sub anthesi 0·3–0·6 mm. longo, sub fructu circiter 1 mm.

longo, anguste obovata, rhomboideo-obovata vel oblanceolata, sub anthesi 4–10 mm. longa, 2–5 mm. lata, sub fructu ad 1·5 cm. longa et 7·5 mm. lata, apice obtusa rotundata vel apiculata, inferne in petiolum sensim angustata, herbacea, anguste hyalino-marginata, superne vel apicem versus minute papillato-ciliolata, ceterum glabra, trinervia nervis lateralibus costae parallelis ad vel ultra $\frac{2}{3}$ procurrentibus ibique cum venulis anastomosantibus, nervis et venulis translucentibus, supra satis pallide viridia, venis inconspicuis, subtus pallidiora. *Flores* singuli in ramulis abbreviatis, expansi ad 1·5 cm. diametro ; pedunculi 5–10 mm. longi. *Sepala* lutea, 3-seriata : extima ovato-oblonga vel oblonga, 2·5–5·5 mm. longa, 1–2·5 mm. lata, apice nonnunquam leviter bifida ; intermedia elliptico-oblonga, 7–8 mm. longa, 3·5–4 mm. lata, apice breviter bifida lobis rotundatis ; intima late obovata, 8–10 mm. longa, 5–6 mm. lata, vix unguiculata. *Petala* pallide aurantiaca, e basi horizontali erecta, suborbiculari-elliptica, 5–5·5 mm. longa, 4 mm. lata, truncata vel retusa ; nectaria allantoidea, 0·6–0·7 mm. longa. *Stamina* petalis paullulo breviora, 4·5 mm. longa, filamentis antheras aequantibus. *Pistillum* lageniforme, 4–4·5 mm. longum ; stigma 1·2 mm. diametro ; ovula 5–12. *Bacca* limoniformis, in sicco 6 mm. longa, stylo cum stigmate 1·5 mm. longo.—*B. montana* var. *chillanensis* C. K. Schneider in Bull. Herb. Boiss. sér. 2, v. 395 (1905), fide specimine authenticato in Herbario Kewensi.

Chile. Cordillera de Chillan, ann. 1856 et 1857, *Ph. Germain* (typus in Herb. Kew.).

Argentina. Baño de Palau Mahida, 1800 m., fl. Jan. 16, 1926, *H. F. Comber* 415a (*fide* H. F. Comber, Andes Exped. 21 : 1928).

Mr. Comber's nos. 479 (fl.) and 415 (fr.) have solitary flowers and agree on the whole with *B. chillanensis*, but have distinctly larger leaves and flowers, intermediate in size between those of *chillanensis* and *montana*. The branchlets, however, are more strongly hirsute than in *chillanensis*, and the peduncles are shortly but densely hirsute. It is therefore convenient to treat these numbers as representing a distinct variety of *B. chillanensis*.

**Berberis chillanensis** var. **hirsutipes** *Sprague* ex Bean in New Flora & Sylva, v. 50 (1932), anglice, var. nov, ; a typo pedunculis breviter at densiuscule hirsutulis differt ; ramuli dense breviter hirsuti ; folia ad 1–2 cm. longa.

Argentina. Suangulo, 1950 m., fl. Jan. 16, 1926, *H. F. Comber* 479 (typus in Herb. Kew.) ; Pulmari (Queseria), 1050 m., fr. Jan. 16, 1926, *H. F. Comber* 415.

The precise inter-relationships of the Andean species of *Berberis*, and the question as to what extent the numerous perplexing forms are due to hybridization or other causes, are problems which can be elucidated only with the aid of extensive special studies in the field. In the meantime it is necessary to have descriptions and names for

the plants actually in cultivation, whatever the status which may ultimately be assigned to them.

Mr. H. F. Comber informs us that in his opinion his nos. 415, 415a, 479 and 798 are all well-connected varieties of *Berberis montana*. He considers that this species, as he found it in the Andes, is a variable plant best distinguished from *B. buxifolia*—to which Reiche in the Flora de Chile united it—by the usually larger flowers, two, three or four in a fascicle or corymb, rarely solitary on the short shoots, the less prominent, brown (when mature) spines slightly but characteristically recurved, and by the fruits being lemon-shaped, not flattened-globose (orange-shaped), as in *B. buxifolia*. He regards his no. 415a as a dwarf mountain form, and nos. 415 and 479 as more or less intermediate forms.

The writer agrees that "*Berberis montana*" as circumscribed by Schneider is a natural group, but prefers, for reasons of convenience, to treat it for the present as including two species, *B. montana*, sensu stricto, and *B. chillanensis*, until it can be shown that the actual range of variation covers both extremes. Gay's description of his *B. montana* mentions that the leaves may reach two inches in length, and that the flowers are either solitary or several together on the short shoots, so that he evidently took the species in a wide sense. Schneider (Bull. Herb. Boiss. sér. 2, v. 295) was apparently the first to segregate varieties, and he selected as type a plant with glabrous branchlets and fascicled or corymbose flowers, represented by Lechler's no. 1990 from the Cordillera de Ranco. This then may be accepted as the lectotype of the name *Berberis montana*.

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## LXIII.—THE GENUS MARISCOPSIS. F. Ballard.

The monotypic genus *Mariscopsis* was described by M. H. Chermezon in 1919 (Bull. Mus. Hist. Nat. xxv. 60 : 1919) from specimens collected in Madagascar and Zanzibar. It was based on *M. suaveolens* Cherm., which was published as a new species. Later, in 1926, R. E. Vaughan collected further material of the species in Mauritius. From the fact that it has appeared only spasmodically and at rare intervals in these islands it was felt that the plant might be an alien weed, imported in some way from the Indian or African mainland. India, as a source, seemed more probable and a search made in certain likely genera of the *Eucypereae* revealed that it was identical with *Pycreus hyalinus* (Vahl) Domin. In the Flora of British India it appears as *Pycreus pumilus* Nees.

The question to be settled, therefore, is whether to retain *Mariscopsis* as a genus or to leave the plant in the genus *Pycreus*. The sole reason for retaining it in *Pycreus* seems to lie in the possession of a biconvex nut, since it cannot be said to resemble in general facies any known species of *Pycreus*. It is generally admitted that the genera of the tribe *Eucypereae* are to a large extent artificial but that they serve as convenient groups. This being so, *Mariscopsis* has as much right to generic segregation as any other genus of the

tribe. On purely technical characters our plant falls into none of the genera possessing two styles and a biconvex nut. From *Pycreus* it differs in possessing a deciduous rhachilla, the spikelets falling entire. *Juncellus* possesses a dorsally compressed nut, whereas the fruit of our species is compressed laterally. Its natural position is probably near *Kyllinga*, in which the spikelets of some species resemble closely those of *Mariscopsis*. It differs, however, in the open umbellate inflorescence, that of *Kyllinga* being densely capitate.

The synonymy of our plant is of interest and an account of it by W. B. Turrill will be found in Kew Bull. 1922, 122, where *Pycreus pumilus* Nees is given as a synonym. Actually, this combination was made by Nees as the result of a wrong identification. We know from his determination of a Wight specimen that our plant was identified by him with *Cyperus pumilus* L. and when transferring a number of species of *Cyperus* to *Pycreus*, a new combination, *Pycreus pumilus* Nees was made for it. Since true *Cyperus pumilus* L. is also a *Pycreus*, Nees' combination, under the present Rules, must be retained for it, while another specific epithet must be found for the plant misidentified by Nees. The earliest name for it appears to be *Cyperus hyalinus* Vahl and, transferring it to Chermezon's genus, it becomes **Mariscopsis hyalinus** (*Vahl*) *Ballard*, comb. nov.

The synonymy is as follows :—*Cyperus hyalinus* Vahl, Enum. ii. 329 (1806). *C. pumilus* Nees in Wight, Contrib. 74 (1834) excl. syn., non L. *Pycreus pumilus* Nees in Linnaea, ix. 238 (1834), quoad specim., excl. syn. *P. hyalinus* Domin in Bibl. Bot. lxxxv. 417 (1915). *Mariscopsis suaveolens* Cherm. in Bull. Mus. Hist. Nat. xxv. 60 (1919).

E. G. Camus in Lecomte, Fl. Indo-Chine, 32, records our species from Annam and Cochin-China (as *P. pumilus* Nees) and while his description seems to fit quite well, the illustration given of a spikelet undoubtedly refers to another species. It probably portrays the Linnaean *Cyperus pumilus* (*Pycreus pumilus* Nees) which is included in the same work under *P. nitens* Nees. There are no specimens of *Mariscopsis* in the Kew Herbarium from Indo-China.

According to C. B. Clarke in the Flora of Tropical Africa, viii., *Mariscopsis hyalinus* has been collected in Mozambique and Timor, although no specimens from the African mainland or from Malaya are now to be found at Kew.

An interesting feature of the plant which appears to have escaped the attention of botanical writers is the possession by it, at least when dry, of a strong odour which exactly resembles that of dried specimens of *Trigonella Foenum-graecum* L. Specimens collected by Wight in India over one hundred years ago still retain this odour to an astonishing degree. The smell is very pungent, reminding one somewhat of curry powder and is due in part, in *Trigonella* at any rate, to the presence of coumarin. Although this substance is present in a number of plants there is no previous record of its occurrence in any member of the Cyperaceae.

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## LXIV.—MISCELLANEOUS NOTES.

Retirement of Mr. Aikman.—The retirement of Mr. John Aikman, M.B.E., on October 8th, 1932, under the age-limit has, to our great regret, brought to a conclusion a career of nearly 44 years in the public service, under three Directors.

Mr. Aikman came to Kew as a Student Gardener on December 10th, 1888, and on January 6th, 1890, was promoted to be "Label-Writer"—a wise selection, as all those familiar with his excellent handwriting will appreciate. On January 1st, 1891, he was appointed a Temporary Technical Assistant in the Herbarium. Four months later he became an acting Assistant, and was established in the latter capacity on July 7th, 1891. He then took up duty in the Director's Office, and he has been the Director's Confidential Assistant during the whole of his established service, extending over a period of more than 41 years. Commencing his work under Sir William Thiselton-Dyer, he developed those methods of accuracy in every detail which have proved invaluable to the establishment.

In recognition of his meritorious service, Mr. Aikman received the Honour of the M.B.E. from H.M. the King at the New Year, 1930.

In wishing Mr. Aikman many years of happiness in his retirement the present Director cordially endorses a statement placed on record by Sir William Thiselton-Dyer when he himself retired in 1905 :—

"The work of the Director's Office is of the most varied kind and requires in its transaction equally varied technical knowledge. Mr. Aikman has acquired a remarkable grasp of it and in the details of daily routine is never at fault. His memory for books, papers and men is simply invaluable.

"But he possesses another qualification which is even more indispensable. The business of my office is frequently of the most confidential kind. I have for a long period of years found myself able to place entire confidence in Mr. Aikman's discretion.

"We have both often had to work at high pressure and Mr. Aikman has never spared himself in rendering me assistance. I feel that I should be wanting in gratitude for his faithful help if I did not place this statement on record." W.T.T.D. 14.xii.05.

In succession to Mr. Aikman, the Minister of Agriculture and Fisheries has appointed Mr. Stuart Frederick Ormsby as Chief Clerical Officer in the Director's Office.

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Mr. Leonard Rodway.—We learn with regret that Mr. Leonard Rodway, C.M.G., has resigned his position as Honorary Government Botanist of Tasmania, mainly on account of failing health.

Mr. Rodway, after a varied early naval and medical career, went to Tasmania in 1880 and soon after joined the Royal Society of Tasmania, of which he has been for so long a very active and highly valued member. He was appointed Honorary Government Botanist in 1896 and, during his term of office, he has built up the Tasmanian

Herbarium and written his well-known "Flora of Tasmania." In addition he has published a very useful book on "The Wild Flowers of Tasmania" and has prepared a complete description of the Mosses and Hepatics of the State.

His services to Tasmanian Botany were very fittingly recognised in the conferment of the Honour of the C.M.G. by H.M. the King in 1917. He was also honoured by his own countrymen when he was presented with the first Royal Society of Tasmania medal in 1928.

Mr. Rodway has been active in many directions in Tasmania and in particular he has been a member of the Scenery Preservation Board, Advisory Officer to the Forestry Department and for some years Lecturer in Botany to the University. As a Trustee of the Botanical Gardens he has done much to keep alive interest in the fine Gardens at Hobart; latterly, since the retirement of the Superintendent, he has resided in the Gardens and it is to be hoped he will be able to supervise their maintenance until the Government of Tasmania finds itself in a position to appoint a new Superintendent.

Mr. Rodway has been a valued correspondent of Kew since the year 1897, and has sent many consignments of Tasmanian plants for the enrichment of the Kew Herbarium.

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Karl Ritter von Goebel.—The death of Geheimrath Professor Dr. Karl Ritter von Goebel on October 9th, in his 78th year, has removed the most prominent figure among the plant-morphologists of his time. He had been Professor of Botany in the University of Munich, and Director of the Botanic Garden there since 1891, and was at his death President of the Bavarian Academy of Sciences. He was foreign Fellow of the Royal Societies of London and Edinburgh, of the Linnean Society, and of many of the Academies of Europe and America. The event does not merely remove a figure universally known in scientific circles, but it closes a brilliant period of Botanical Science in Germany. Doubtless his influence lives through his pupils, and through the readers of his prolific writings. Their effect will continue to be felt wherever Botany is studied. Nevertheless his death breaks a traditional sequence continuous from Hofmeister himself. He was in fact the last surviving pupil of that great master.

Nursed in the methods of von Mohl, and in the clear inductive reasoning of Schleiden, and with our own Robert Brown as a contemporary, Hofmeister in 1847 formulated, on the basis of his own original observations, the underlying scheme of life as seen in Mosses, Ferns and Conifers, thereby introducing the great synthesis centred in the expression "Alternation of Generations." To him, as he was serving his last years in the Chair at Tübingen, came young Goebel, a native of Bellighem in Baden. Nothing learned there was lost on him, as we may judge from his filial essay written in 1924 to celebrate the Centenary of Hofmeister's birth. An English translation of this essay was published by the Ray Society in 1925. None of the vast

contributions of von Goebel to the literature of Botany conveys more clearly his deep philosophical insight than this volume of appreciation, tinged as it is with the natural criticism of a later age. Nor could any writer place more justly in its frame the portrait of the founder of a new phase of botanical thought. But it rested with the pupil, thus "blooded" in the pursuit of Science, to extend its scope.

Young Goebel passed from Tübingen to Würzburg, where he was stimulated by the radiant intellect of Sachs, and to the Institute in Strassburg, then directed by De Bary. After such favourable training his own natural powers of investigation carried him through rapid steps of promotion to the important Chair of Botany in the University of Munich. Here he established a thriving school of investigation, and developed his own researches, the results of which are now summarised in his great work "Organographie der Pflanzen," of which the third edition awaits only the issue of its last part for its completion. The book stands unrivalled, whether as the achievement of a single brain, or as an epitome of the work of a long life of intense activity and unusual opportunity.

Botanists in Britain knew von Goebel well. His frequent visits, his attractive personality, and his knowledge of our language all helped to cement friendship based upon supreme scientific quality. There was a strong bond between Kew and the Botanic Garden at Munich, and, among other gifts, Kew received an interesting collection of Ferns and Stove plants in 1930. Students knew him by the translation of his "Outlines" and of the first edition of the "Organographie," both having been published by the Oxford Press. For plant-morphologists his influence was wide and deep, though persuasive rather than dogmatic. His chief aim seems to have been to read the riddle of causality, rather than to pursue the elusive and protean phantom of phylogeny. His life leaves our science greatly enriched. His many friends will rejoice that he maintained his powers of thought to the very end. F. O. B.

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Everard im Thurn.—By the death of Sir Everard im Thurn, K.C.M.G., K.B.E., on October the 8th, at the age of 80, Kew loses one of her oldest and most valued correspondents.

Educated at Marlborough and Exeter College, Oxford, where he graduated in 1875, Sir Everard's first connection with Kew was in 1877, when Sir Joseph Hooker was instrumental in obtaining for him the post of Curator of the British Guiana Museum at Georgetown. From here he soon commenced sending back collections of living and dried plants to Kew, a practice which he continued throughout a long career of colonial administration.

In 1882 he was appointed Special Magistrate of the Pomerun District, a post which, however, did not interfere with his botanical activities and in 1884 he published a paper entitled "The Palms of

British Guiana " in " Timehri," a Guiana journal of which he was the editor and founder.

In the same year he accomplished his historic ascent of Roraima, a most vivid account of which appeared in the proceedings of the Royal Geographical Society for 1880. The plants collected on this expedition were described by Professor Daniel Oliver in the Transactions of the Linnean Society for 1886, and are now in the Herbarium at Kew.

In 1890 Sir Everard was appointed Government Agent in the North West District, a post which he held until 1899, when he was transferred to the Colonial Office. Here he remained only a year, proceeding to Ceylon as Colonial Secretary and Lieutenant Governor in 1901. In Ceylon official routine kept him exceedingly busy and it was not until 1904, when he was appointed Governor of Fiji and High Commissioner of the Pacific, that he again became botanically active.

Between 1904 and 1910, when he retired, Sir Everard collected extensively in the Fijian Islands and sent his plants to be worked out at Kew. In 1915 a list of the Phanerogams in his collections was published in the Journal of the Linnean Society. Out of a total of 72 species, 24 were new, the majority of which came from the Nandarivatu District and Kandava. The Ferns were enumerated later in the *Kew Bulletin*, 1930, 343.

Sir Everard was a zoologist and a distinguished anthropologist as well as a botanist, and was the author of several books of travel, notably " Among the Indians of Guiana " (1883). He also published an interesting account of the Western Pacific in the Geographical Journal for 1909.

Sir Everard received the Honour of the K.C.M.G. in 1905 and the K.B E. in 1918.

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**The name Pinus laricio.**—The specific epithet is commonly spelt with a capital initial letter, but as it is neither a personal nor a generic name, it should be spelt as above. The Italian vernacular name " Larizio " or " Laricio " appears to be applied to one or two species of *Pinus*, namely, to *P. nigra* Arnold (*P. laricio* Poir., 1804), and possibly to *P. Pinaster* Sol. (*P. laricio* Savi, 1798). Savi (Fl. Pis. ii. 353 : 1798*) gave the Italian name of his *Pinus Laricio* [sic] as " Pino Larizio," and O. Targioni Tozzetti (Diz. Bot. Ital. ed. 2, i. 216 : 1825) cited it as " Pino Laricio." Poiret (Lam. Encycl. v. 339 : 1804) in publishing his *Pinus laricio* omitted to explain the derivation of the specific epithet. The vernacular Italian name " Pino laricio " was, however, cited for it by Tenore (Fl. Nap. v. 267 : 1835–36), and the form " Pino Laricio " by Bertolini (Fl. Ital. x. 263 : 1854) and Parlatore (Fl. Ital. iv. 53 : 1867). Piccioli (Piant. Legn. Ital. 77 : 1890) cited " Pino laricio," " Laricio " and " Larice

*Bertoloni (Fl. Ital. x. 261) and Parlatore (Fl. Ital. iv. 38) cited this name from Santi, Viagg. terz. 60, t. 1, which I have not seen.

di Corsica " among the vernacular names of *P. laricio* Poir. He gave no similar name under *P. Pinaster* Sol., so that it seems probable that the epithet *laricio* was applied to that species owing to confusion with *P. nigra* Arnold. Penzig (Fl. Pop. Ital. i. 355 : 1924) also cited " Pino laricio," " Laricio," and " Larice di Corsica " among the Tuscan vernacular names of *P. laricio* Poir., but gave no similar name under *P. maritima* L. (*P. Pinaster*). The statement by K. Koch (Dendrol. ii. Abth. 2, 287 : 1882) that the vernacular name " Laricio " is applied in Italy to *P. Pinaster* as well as to *P. maritima* Mill. (*P. laricio* Poir.) is apparently based on Savi.

The existence of the variant " Larice di Corsica " suggests a connection between " Laricio " and *Larix* (Ital. " Larice "). At the same time it is difficult to see any resemblance between either of the two species concerned and the common Larch. Nevertheless the names " Larch Pine," and " Lärchen-kiefer " (or " Lerchen-kiefer ") have been coined by English and German botanists respectively for *P. laricio* Poir. Loudon (Arb. et Frut. Brit. iv. 2200 : 1838) used the former ; and the latter is cited among the German names of *Pinus laricio* Poir. by Gerth van Wijk (Dict. Pl. Names, 1006 : 1911). According to Pritzel and Jessen (Deutsch. Volksnam. Pfl. 278 : 1882) the form " Lerchenkiefer " is employed in Austria for *P. laricio* Poir. T. A. S.

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**South Indian Weeds.***—This publication of the Department of Agriculture, Madras, is in the same series as " Some South Indian Grasses " and furnishes a further example of the value of systematic botany to the agriculture of a country. The major portion of the book is devoted to descriptions of individual weeds, most of which are accompanied by excellent line drawings of the plants, showing their seeds and other organs by which they can readily be recognized. As an introduction to each description the English name of the weed, if such exists, is given, as well as its name in the principal vernaculars. This is followed by a note of the flowering and fruiting season, the habit of the plant, its habitat, the soil types which it prefers, how it is propagated and the approximate number of seeds which a plant can produce. Below the description there is a short note suggesting methods of control and if the plant is reputed to be of economic importance (many of them have a reputation of medicinal value) mention is made of its uses.

As numbers of these weeds are cosmopolitan in the dry tropics and as others have close relatives which are also obnoxious weeds in other countries, this book deserves a much wider circulation, among those interested in village life in the tropics, than in the confines of an Indian Province.

The earlier chapters of the book consist of an introduction to botanical terms of nomenclature, a classification of weeds, and their

*Handbook of Some South Indian Weeds, by C. Tadulinggam, F.L.S., and G. Venkatanarayana, B.Sc. (Ag). Pp. vii.+356. Printed and published by the Superintendent, Government Press, Madras. Price Rs. 4.

methods of propagation. This is followed by a descriptive and illustrated chapter on weed seeds and weed seedlings and another on general methods of weed control. At the close of the book there is a bibliography and a glossary of botanical terms.

The authors are to be congratulated both on the subject matter of the book and on the manner in which it has been presented. The Superintendent of the Government Press is also to be congratulated on the general style of the publication and the excellent reproduction of the illustrations.

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**Chromosomes and Plant Breeding.***—The practical plant-breeder finds particular difficulty in assimilating the results of modern work on chromosomes. He is frightened by the array of new terms and by the mathematical puzzles which are continually confronting him. Dr. Darlington, in the present volume, aims at presenting these results in as clear a way as possible and in a form easily applicable to the problems of plant breeding.

The earlier chapters are devoted to a brief outline of Cytological and Mendelian facts. These are followed by sections on various aspects of Polyploidy and its relation to plant breeding.

The later chapters show very strikingly the great light that the study of chromosomes has thrown on the history of our cultivated plants. They also show how much success in breeding for new forms depends on a knowledge of chromosome behaviour. In breeding apples and pears, for example, it might be expected that the most vigorous varieties would give the best seedlings. An examination of the chromosomes of such varieties, however, shows that they are frequently triploid and hence useless for breeding work.

This book, which had appeared previously in a slightly different form as a series of articles in " The Gardeners' Chronicle," should be extremely helpful both to breeders and to the " lay-scientist " wishing to obtain a clear view of modern work on chromosome behaviour.

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*By C. D. Darlington, Ph.D., D.Sc., with a foreword by Sir Daniel Hall, K.C.B., F.R.S. Macmillan & Co., Limited, London, 1932. Pp. xiv+112, 25 figs. Price 7*s.* 6*d.*

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